The Ø 20 x 15 km Tejeda Crater on Gran Canaria (Canary Islands)

- RAMAN Spectra of selected Rock Samples -

by Harry K. Hahn / Germany - 16.3.2022

Summary :

Here a summary of the Raman-spectroscopic analysis a of rock-samples which I have collected near the **Ø 20 x 15 km "Tejeda Impact Crater"** on Gran Canaria, and on other interesting sites on the Island.

The Gravity Anomaly Map of the Canarian Islands indicates a large scale Impact Event. This impact event probably was the result of Ejecta from the PTI (Permian Triassic Impact) which formed a large secondary crater, the hypothetical **Ø 430 x 290 km Gibraltar Crater (GIC).** (see gravity anomaly map on the next page). The smaller ellipitical impact craters indicated on this Gravity Anomaly map, as negative anomalies offshore of the Islands Fuerteventura, Teneriffa and Lanzarote, belong to this impact event and are located along the hypothetical crater-wall (-rim) of the **GIC**. A magnetic anomaly map of the Atlantic Ocean-floor south-west of Spain provides indication for this Ø 430 x 290 km Gibraltar Crater. (→ explanation on **pages 28** & **29** of my **PT Impact Hypothesis: Part 2** (or here: **P2**))

The hot spots which caused the Canary Islands originally were impact sites of large ejecta fragments, which were ejected from the Permian Triassic Impact (PTI) Crater in the Arctic Sea.

And I am sure that these impact sites (hot spots) were produced by the same large-scale secondary impact event (caused by the PTI), which also has formed the **Bay of Lyon Crater** (or **BLC**) and **other impact structures in Spain** (or **L2**). Also read about **the Ø 13,5 x 10 km Ajuy Crater on Fuerteventura.**

On Gran Canaria one of the ejecta fragments of the PTI has formed an elliptical impact crater which is located nearly in the center of the island. But even if this secondary crater of the PTI is easy accessible, it will be difficult to provide proof for this impact crater, because of the relatively low impact pressure which only has caused weak shock-metamorphic effects and because the hotspot that was caused by the impact has erupted massive amounts of magma (lava) over the last ~250 Myrs and covered the original impact structures. To provide clear evidence for this impact crater it probably will be necessary to drill deep into the crater-wall of the Tejeda Crater and get drill-core samples from a few km depth.

In all rock samples which I have collected no quartz was found. Therefore it will be difficult to provide first proof for this secondary impact of the PTI, with this Raman spectroscopic analysis of some samples

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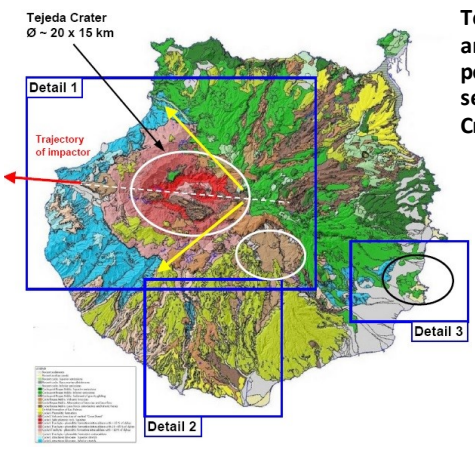
Some of the analysed feldspar-samples may show Raman-spectra which indicate (W)-weakly-shocked or (M)-moderately-shocked Feldspar. The Raman-spectra from the following sample sites No.: **15-A, 23, 28, 32 & 33** may indicate shocked feldspar-minerals. These Raman-spectra must be further analysed by experts with the experience to correctly assess such spectra. (→ explanation to Raman-spectra of shocked Feldspar : see at page **30** in the **Appendix 3**) Beside possible shocked feldspar minerals other minerals, e.g. a number of iron-bearer-minerals found on the island, may also indicate an impact event. Minerals found in the analyses : Albite, Anorthoclase, Augite, Corvusite, Coyoteite, Cronstedtite, Hollandite, Labradorite, Magnetite, Microcline, Oligoclase, Orthoclase, Tengerite, etc.

→ Images of the analysed rock samples and photos of the sample sites are in the Appendix at page **21**

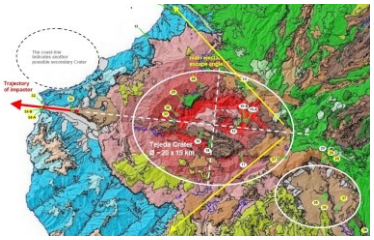
→ A general summary to all analysed samples regarding my **PTI-hypothesis** (**P1**) → in **Part 6** (or: **P6**)

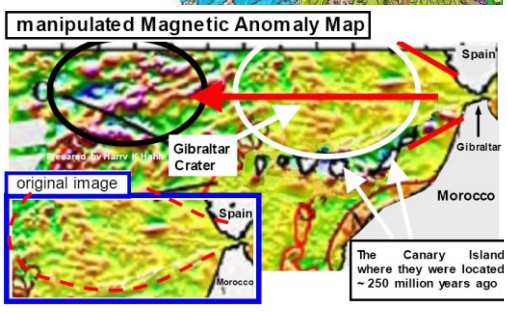
→ More images of all sample sites are available on www.permiantriassic.de or www.permiantriassic.at

Geological Map of Gran Canaria with the possible Tejeda Crater marked on the map

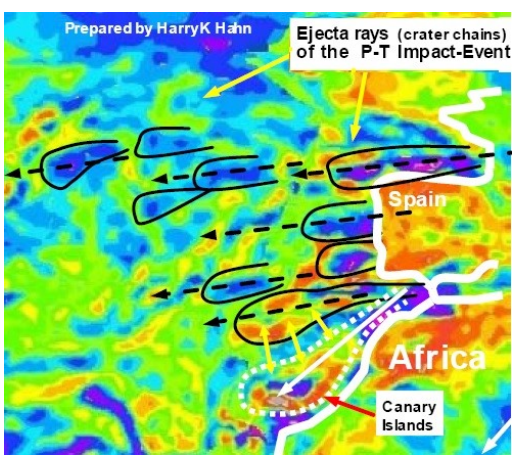


Detail of the Geological Map showing the Tejeda Crater and two more possible PTI-secondary Craters





Gravity Anomaly Map of the Canarian-Island-area

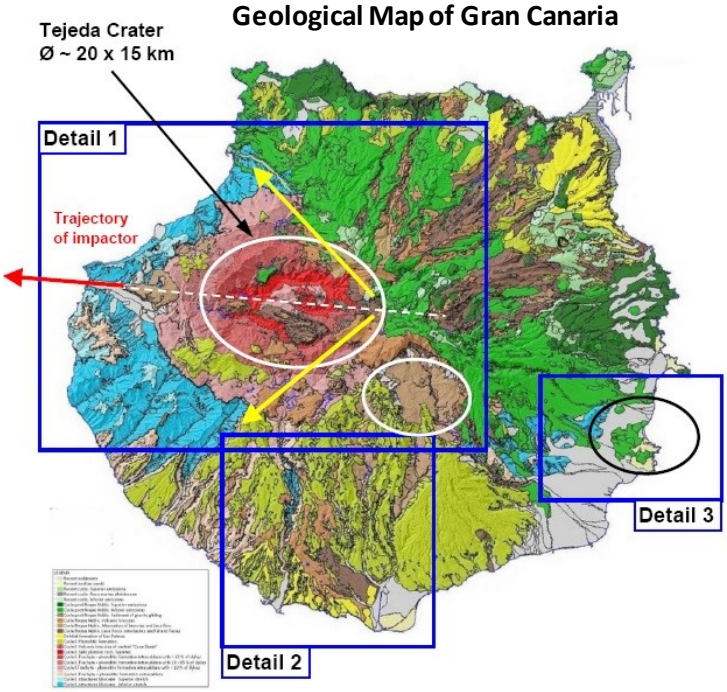


The Ø 20 x 15 km Tejeda Crater on Gran Canaria

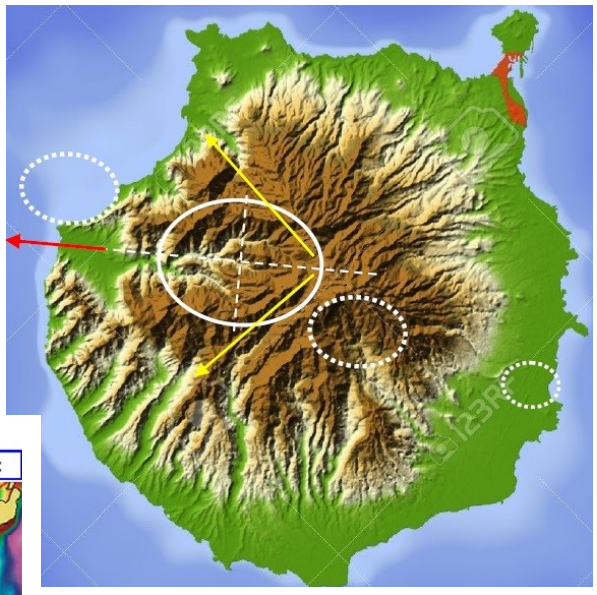
The geological map and the topographic map of the Island Gran Canaria indicate an Impact Event.
This is the **Ø 20 x 15 km** hypothetical **Tejeda Crater**, which is located nearly in the center of the Island. The village Tejeda is located inside this crater. The current believe that this precise elliptical crater-structure is the caldera of a large inactive volcano probably isn't correct !
I want to refer here to the other decribed elliptical impact craters on the Islands Tenerife and Fuerteventura, which in all probability were caused by ejecta–fragments from the Permian-Triassic-Impact (PTI). These elliptical crater-structures are all located offshore of these islands.
And the gravity anomaly map clearly indicates elliptical-shaped negative (blue) gravity anomalies (see map below)
But even if this probable secondary-crater of the PTI is easy accessible in the center of Gran Canaria, it will be difficult to provide proof for this impact crater, because of the relatively low impact pressure which only has caused weak shock-metamorphic effects and because the hotspot that was caused by this impact has erupted massive amounts of magma (lava) over the last ~250 Myrs and covered the original impact crater with thick layers of lava.
To provide clear evidence for the impact crater it probably will be necessary to get drill-core samples from deep inside the crater-walls of the Tejeda Crater.

The Raman-spectra of the analysed rock-samples may provide first indication for an impact event. Shocked feldspar may be present on the **sample sites 23, 28, 32, 33**

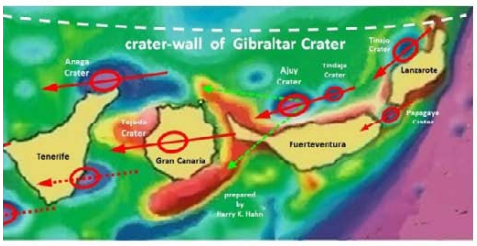
Geological Map of Gran Canaria



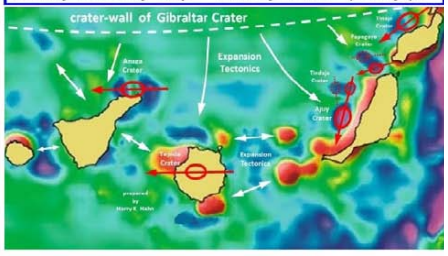
Topographic Map of Gran Canaria



→ Islands locations **shortly after** the **PTI** - impact event :
manipulated Gravity Anomaly Map :



→ original Gravity Anomaly Map :
Gravity Anomaly Map – Canary Islands (today) :

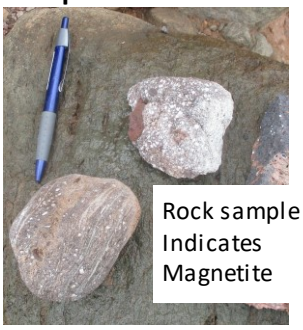


The Gravity Anomaly Map of the Canarian Islands indicates a large scale Impact Event

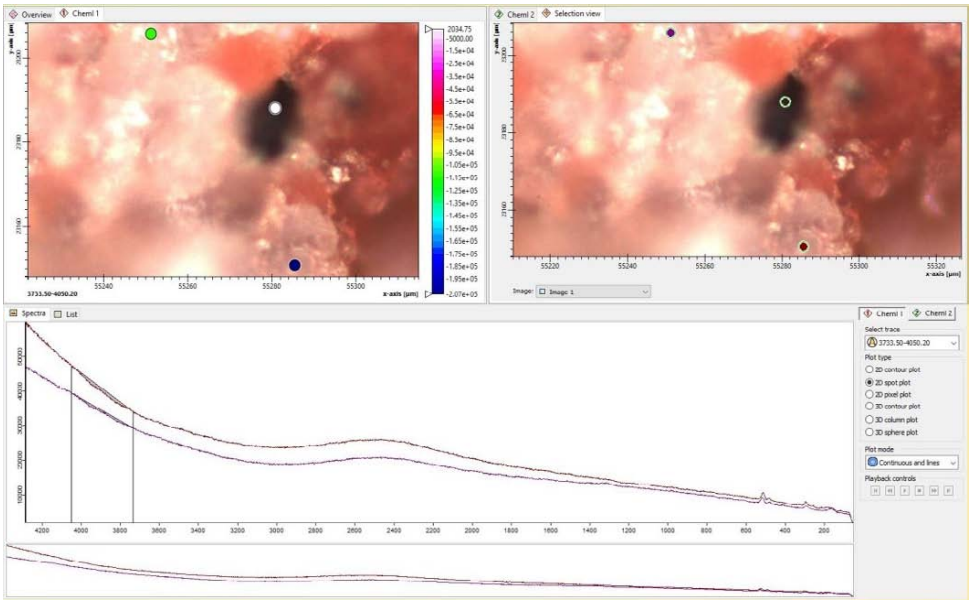
Different types of feldspar-breccia on **sample site 32**
(pebbles on the beach, west of the Tejeda Crater)

Rock of the crater-wall of the Tejeda Crater on **sample site 28 :**

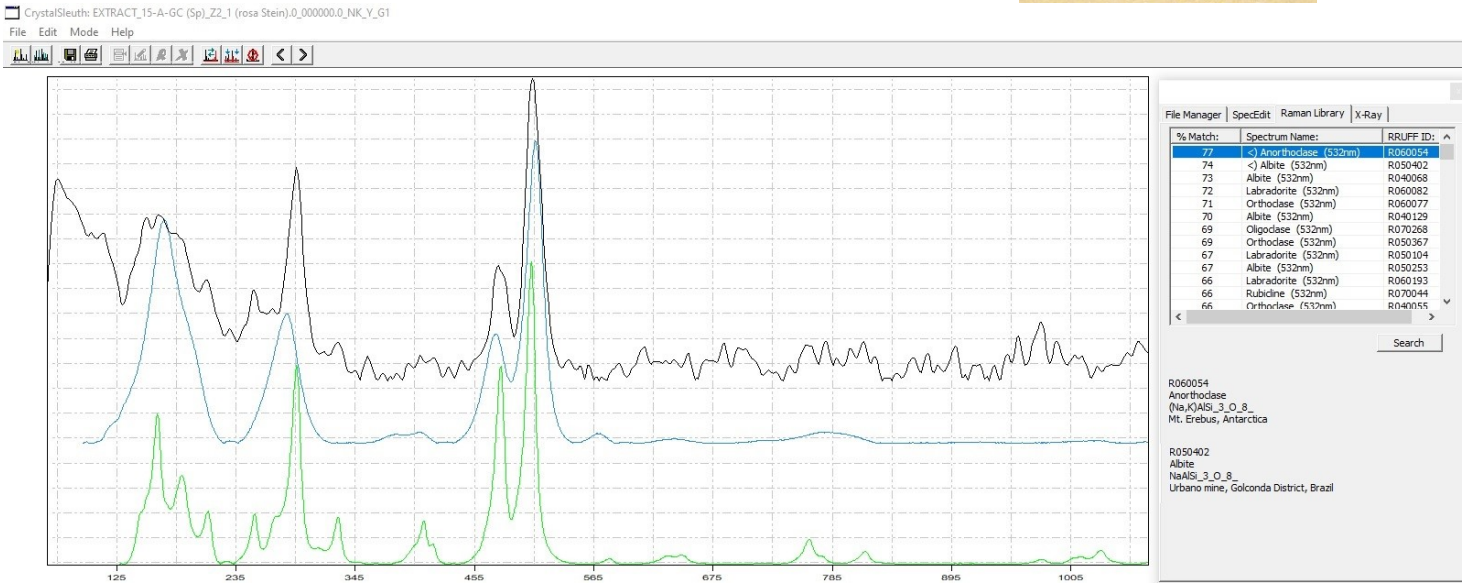
Rock samples from the tip of the outflow-tongue from the Tejeda Crater on **sample site 33 :**

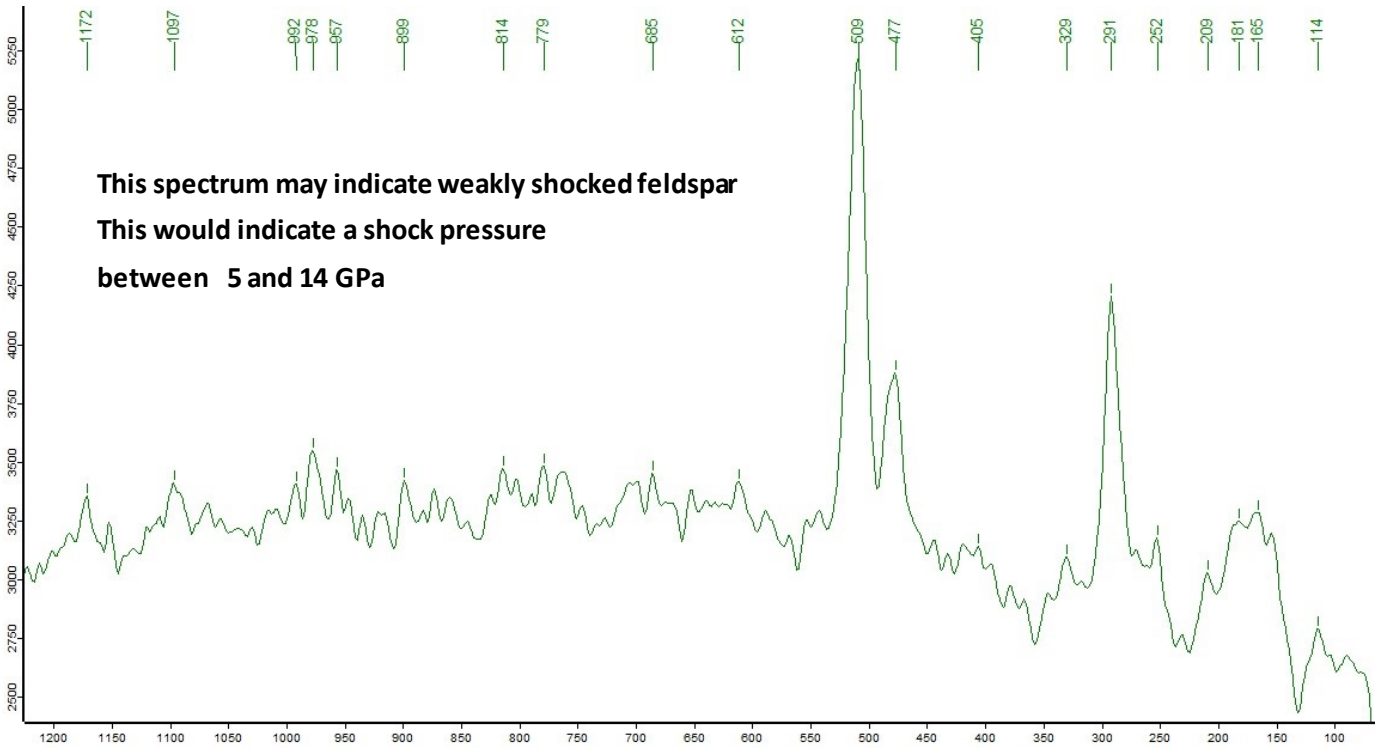


Sample Site 15-A : Stone 1_spectra 1 indicates : Anorthoclase, Albite (→ see RRUFF_CS results)

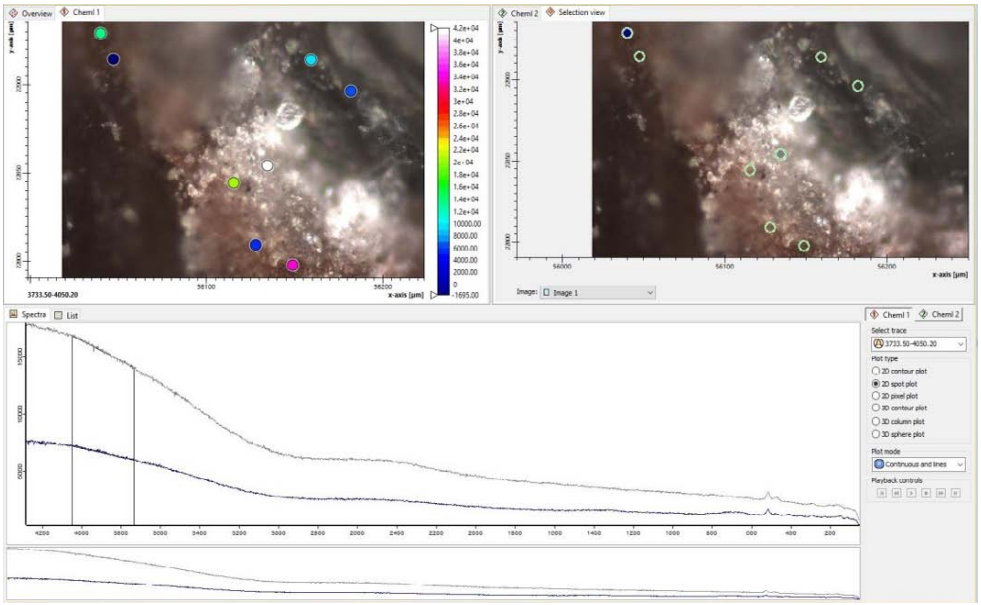


Sample :

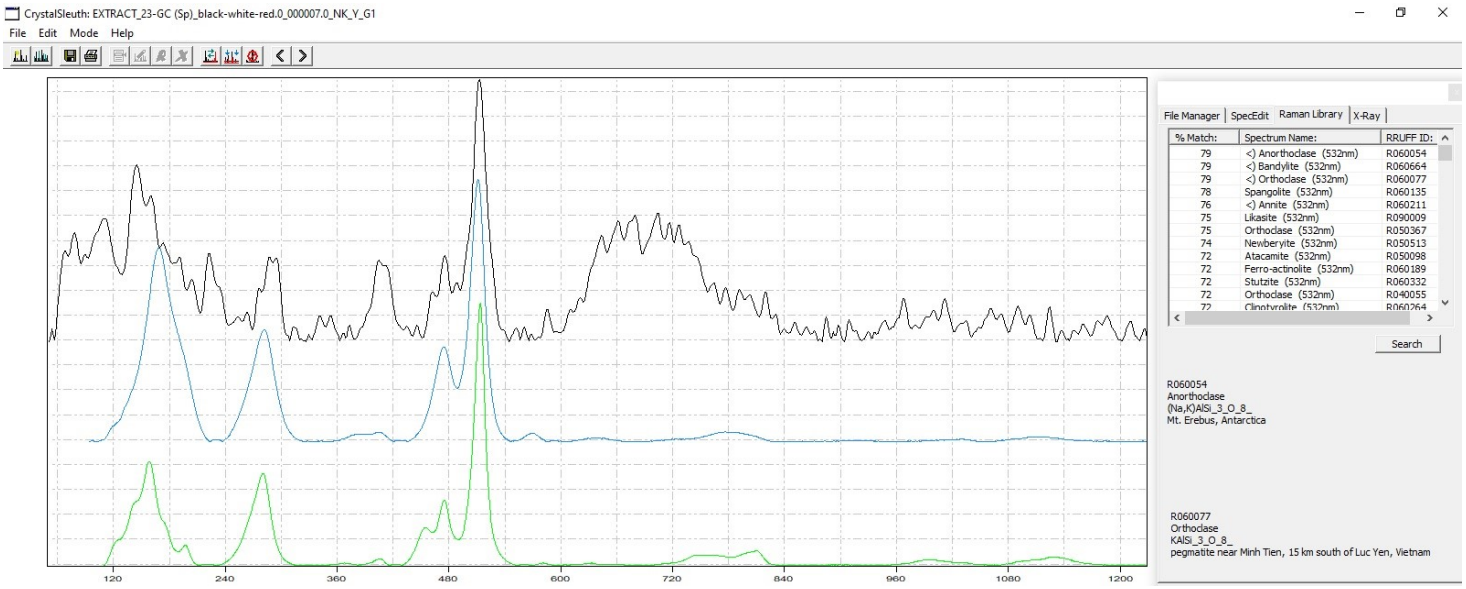

CrystalSleuth: EXTRACT_15-A-GC (Sp)_Z2_1 (rosa Stein).0_000000.0_NK_Y_G1
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
77 | <) Anorthoclase (532nm) | R060054
74 | <) Albite (532nm) | R050402
73 | Albite (532nm) | R040068
72 | Labradorite (532nm) | R060082
71 | Orthoclase (532nm) | R060077
70 | Albite (532nm) | R040129
69 | Oligoclase (532nm) | R070268
69 | Orthoclase (532nm) | R050367
67 | Labradorite (532nm) | R050104
67 | Albite (532nm) | R050253
66 | Labradorite (532nm) | R060193
66 | Rubicline (532nm) | R070044
Search
R060054
Anorthoclase
(Na,K)AlSi_3_O_8_
Mt. Erebus, Antarctica
R050402
Albite
NaAlSi_3_O_8_
Urbano mine, Golconda District, Brazil

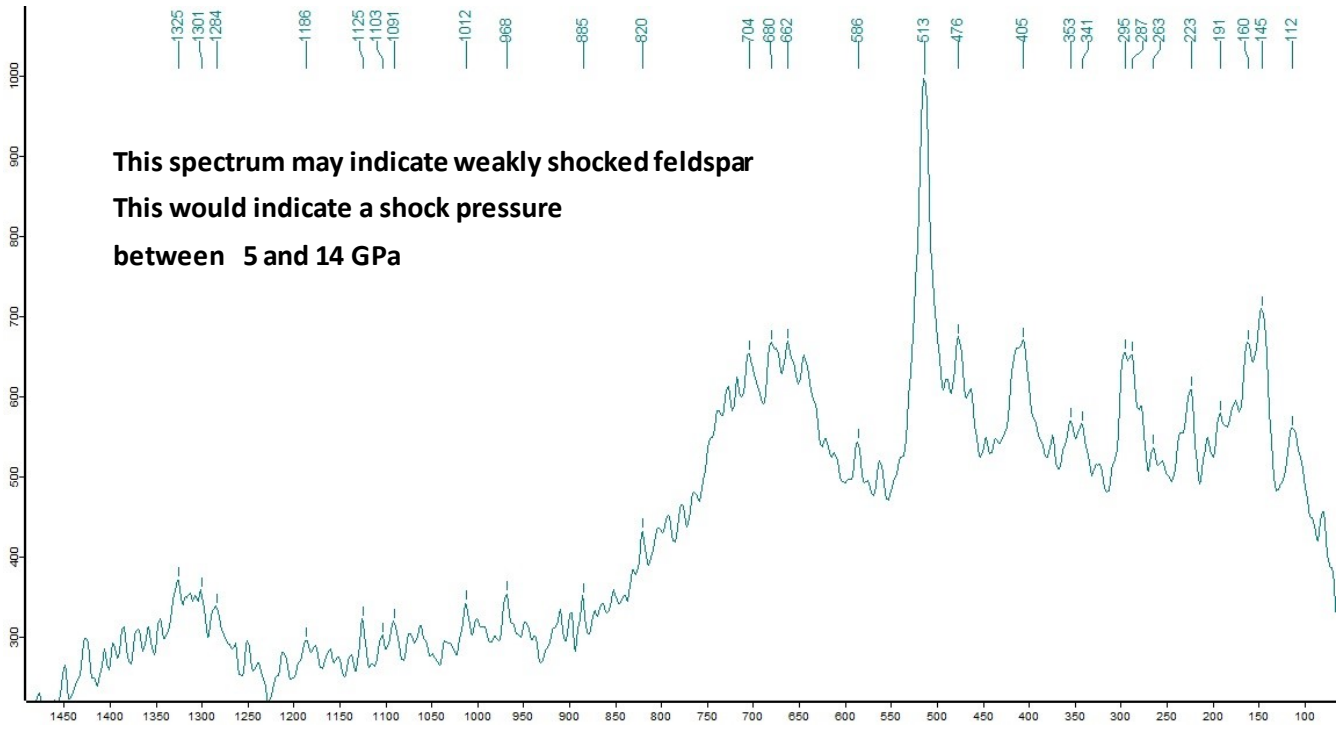


Sample Site 23 : Stone 1_spectra 1 indicates : Anorthoclase, Orthoclase (→ see RRUFF_CS results)

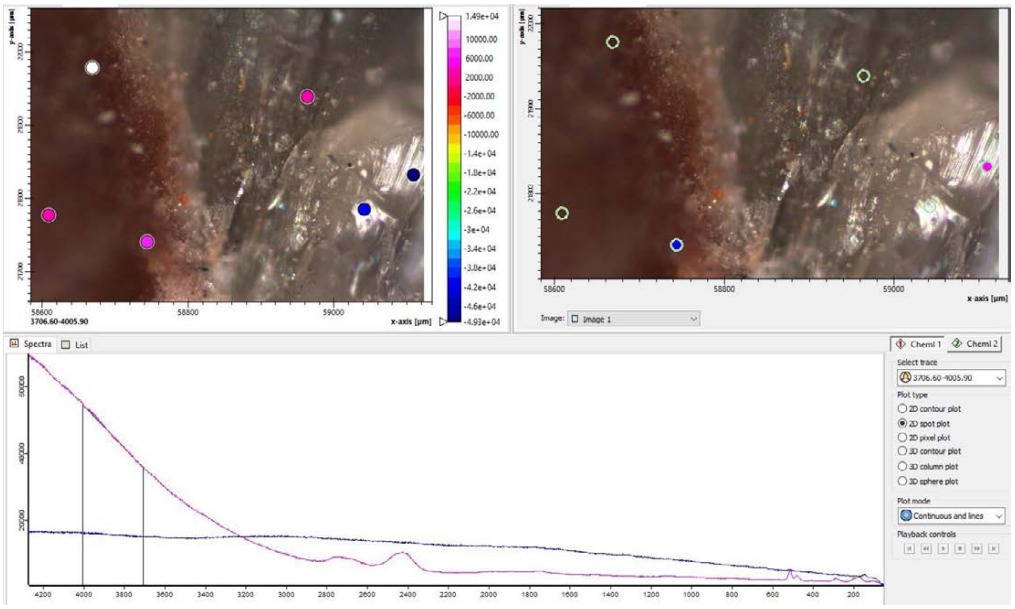


Sample :

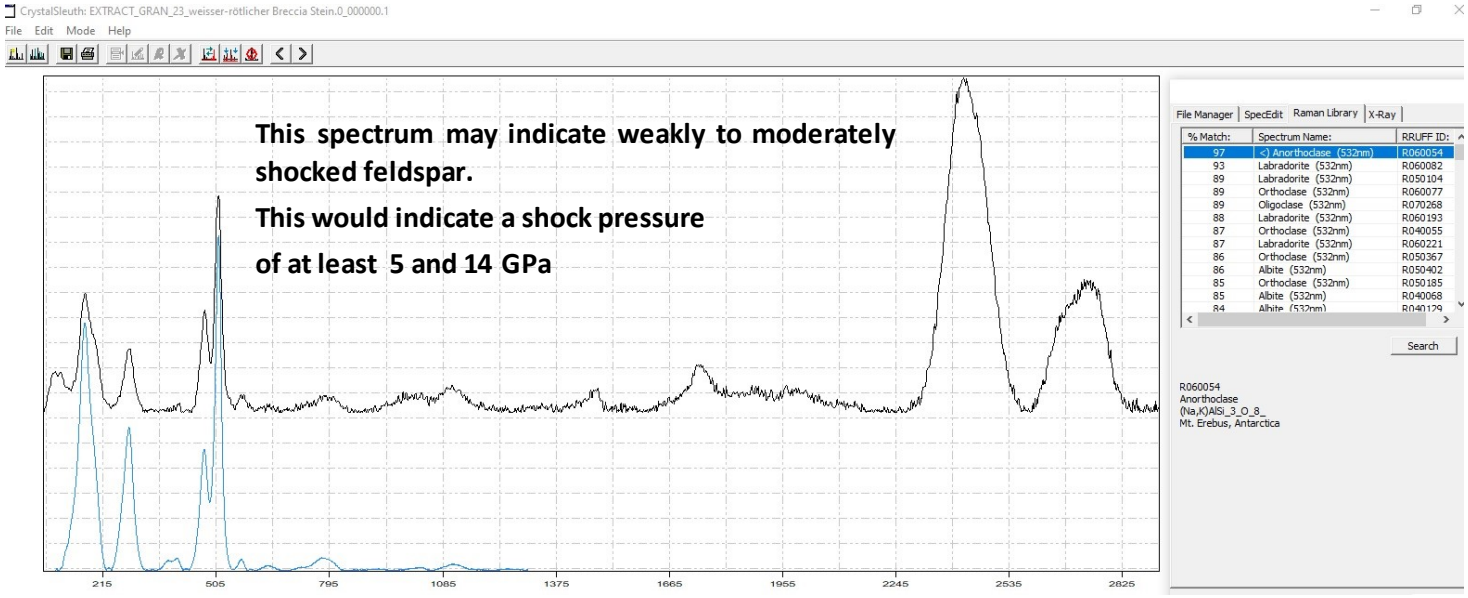




Sample Site 23 : Stone 2_spectra 1 indicates : Anorthoclase (→ see RRUFF_CS results)



Sample :


CrystalSleuth: EXTRACT_GRAN_23_weisser-rötlicher Breccia Stein.0_000000.1
File Edit Mode Help
This spectrum may indicate weakly to moderately shocked feldspar.
This would indicate a shock pressure of at least 5 and 14 GPa
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
97 | Anorthoclase (532nm) | R060054
93 | Labradorite (532nm) | R060082
89 | Labradorite (532nm) | R050104
89 | Orthoclase (532nm) | R060077
89 | Oligoclase (532nm) | R070268
88 | Labradorite (532nm) | R060193
87 | Orthoclase (532nm) | R040055
87 | Labradorite (532nm) | R060221
86 | Orthoclase (532nm) | R050367
86 | Albite (532nm) | R050402
85 | Orthoclase (532nm) | R050185
85 | Albite (532nm) | R040068
Search
R060054
Anorthoclase
(Na,K)AlSi_3_O_8_
Mt. Erebus, Antarctica

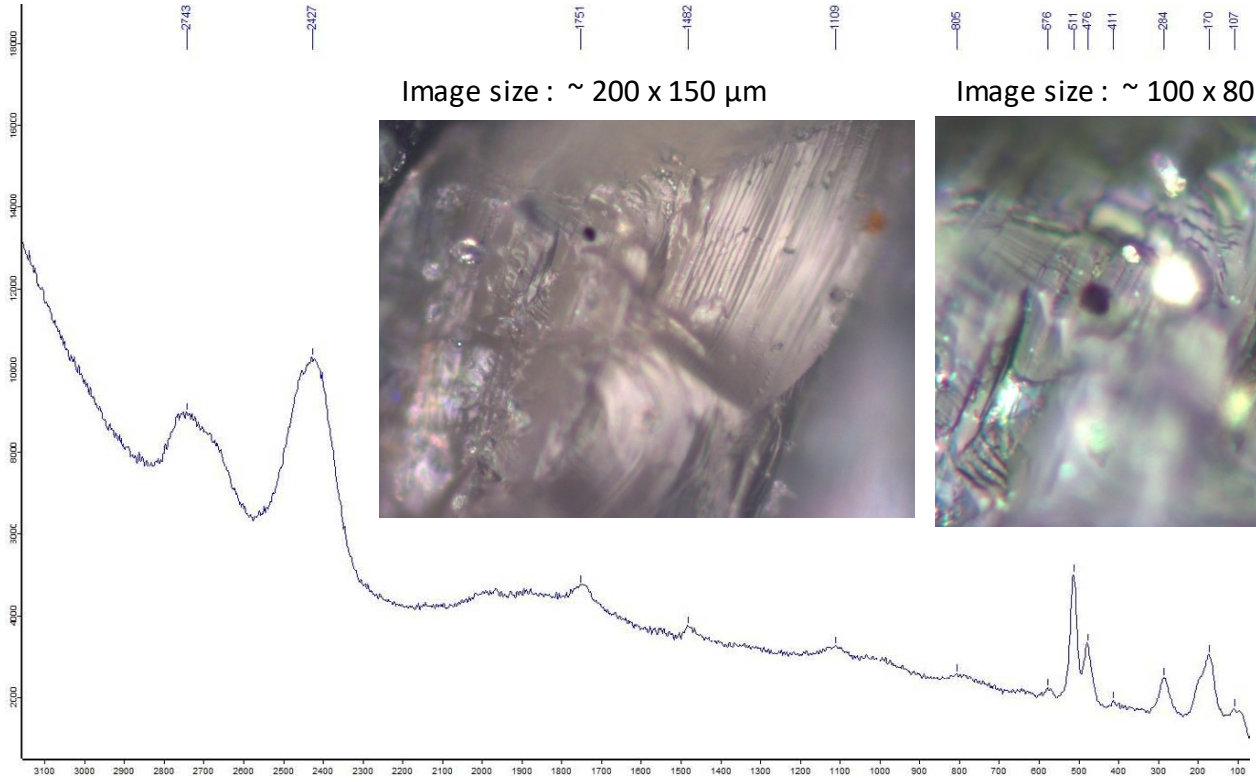
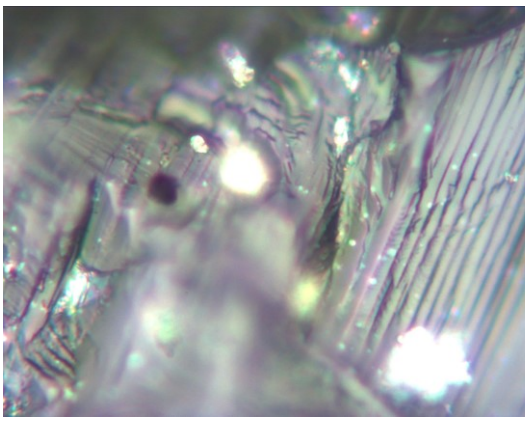


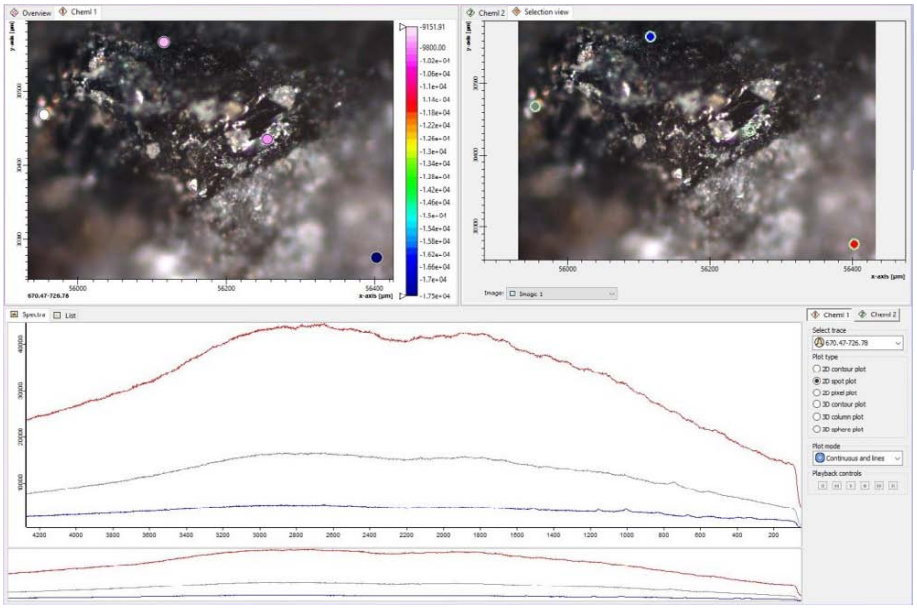
Image size : ~ 200 x 150 µm

Image size : ~ 100 x 80 µm

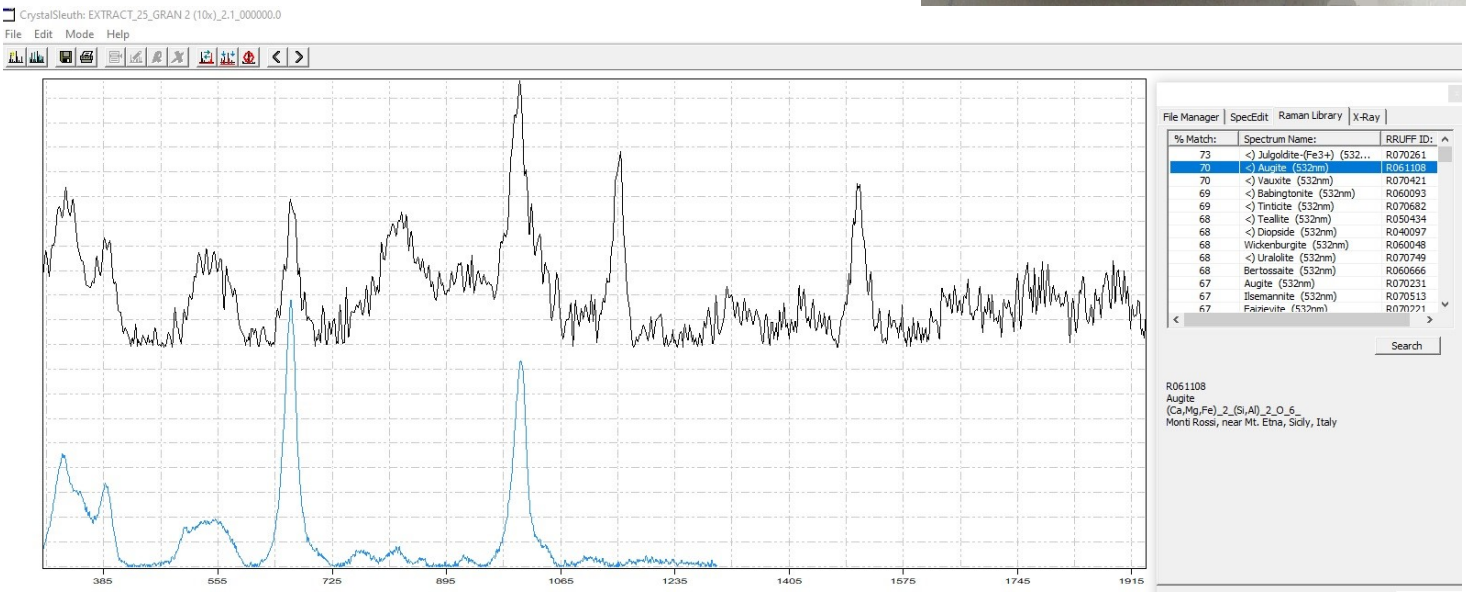


Sample Site 25 : Stone 1_spectra 1 (dark mineral inclusions) indicates : Augite (→ see RRUFF)

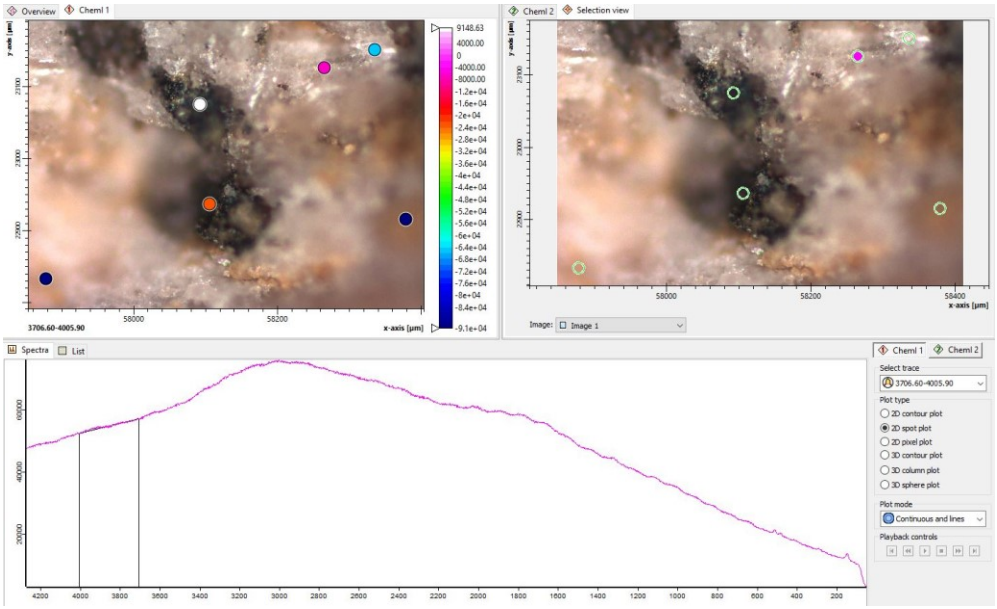
possible Iron-bearer mineral



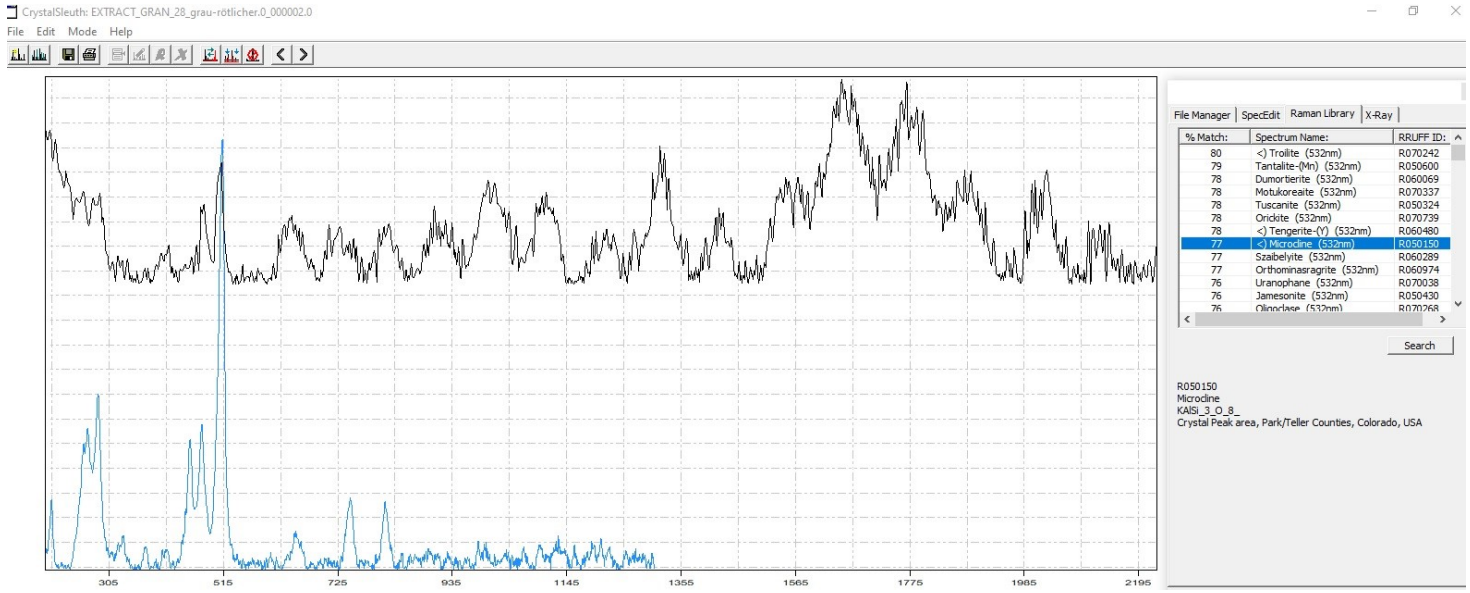
Sample :

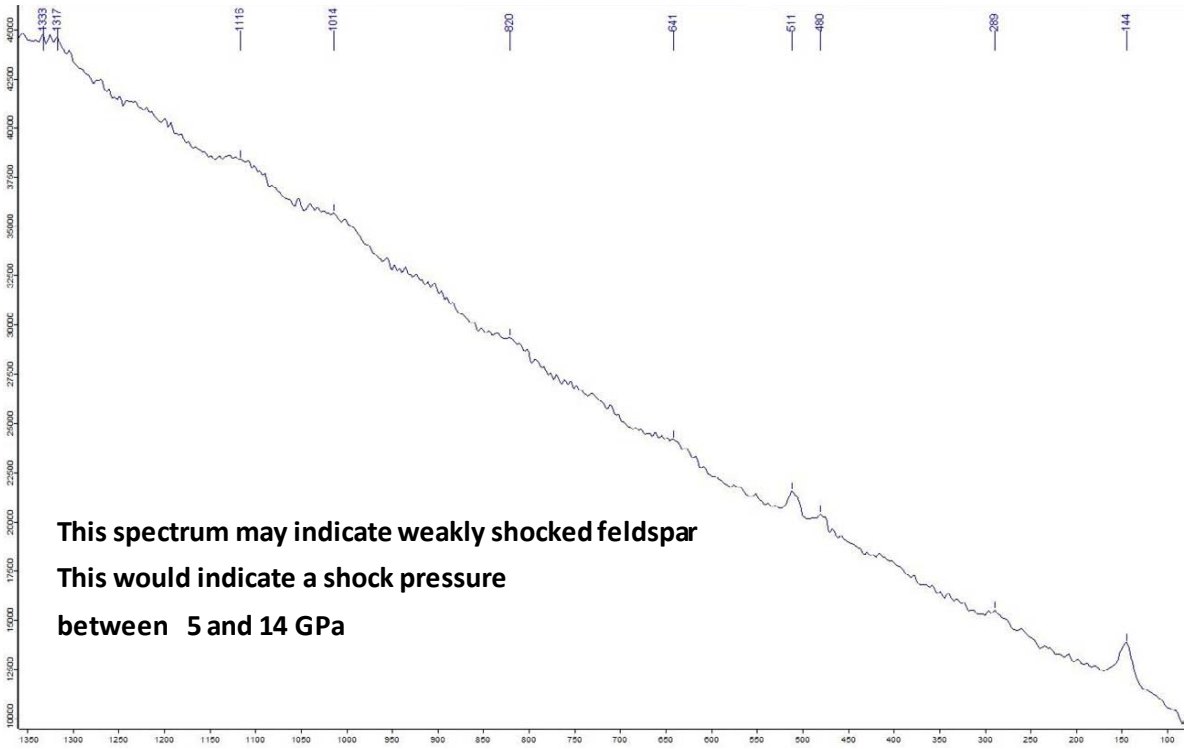

CrystalSleuth: EXTRACT_25_GRAN 2 (10x)_2.1_000000.0
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
73 | <) Julgoldite-(Fe3+) (532... | R070261
70 | <) Augite (532nm) | R061108
70 | <) Vauxite (532nm) | R070421
69 | <) Babingtonite (532nm) | R060093
69 | <) Tinticite (532nm) | R070682
68 | <) Teallite (532nm) | R050434
68 | <) Diopside (532nm) | R040097
68 | Wickenburgite (532nm) | R060048
68 | <) Uralolite (532nm) | R070749
68 | Bertossaite (532nm) | R060666
67 | Augite (532nm) | R070231
67 | Ilsemannite (532nm) | R070513
Search
R061108
Augite
(Ca,Mg,Fe)_2_(Si,Al)_2_O_6_
Monti Rossi, near Mt. Etna, Sicily, Italy
385 555 725 895 1065 1235 1405 1575 1745 1915

Sample Site 28 : Stone 1_spectra 1 indicates : Microcline (→ see RRUFF_CS results)



Sample :


CrystalSleuth: EXTRACT_GRAN_28_grau-rötlicher.0_000002.0
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
80 <) Triolite (532nm) R070242
79 Tantalite-(Mn) (532nm) R050600
78 Dumortierite (532nm) R060069
78 Motukoreaite (532nm) R070337
78 Tuscanite (532nm) R050324
78 Orickite (532nm) R070739
78 <) Tengerite-(Y) (532nm) R060480
77 <) Microcline (532nm) R050150
77 Szaibelyite (532nm) R060289
77 Orthominasragrite (532nm) R060974
76 Uranophane (532nm) R070038
76 Jamesonite (532nm) R050430
Search
R050150
Microcline
KAlSi_3_O_8_
Crystal Peak area, Park/Teller Counties, Colorado, USA

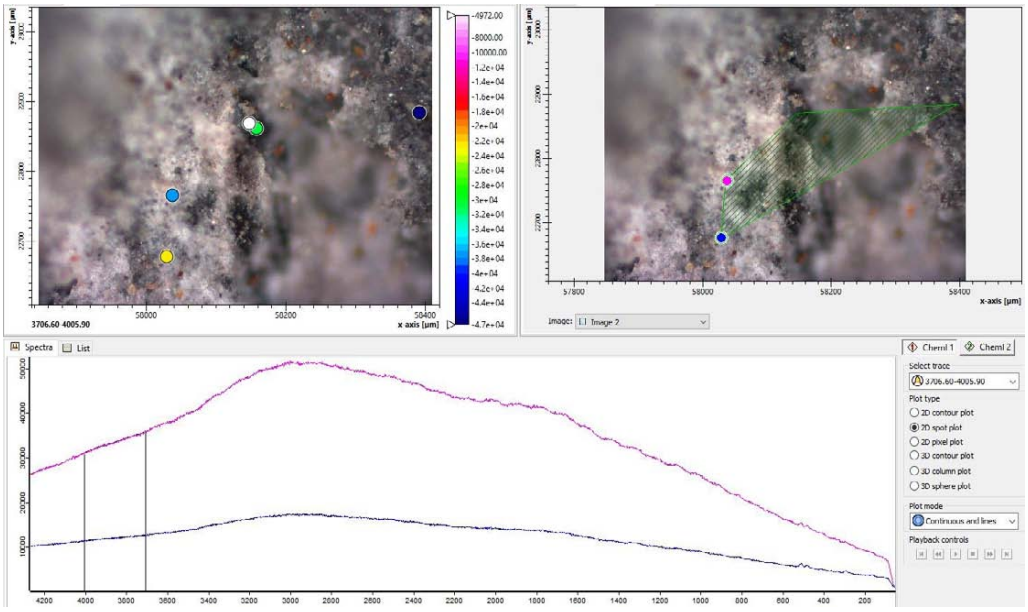


This spectrum may indicate weakly shocked feldspar

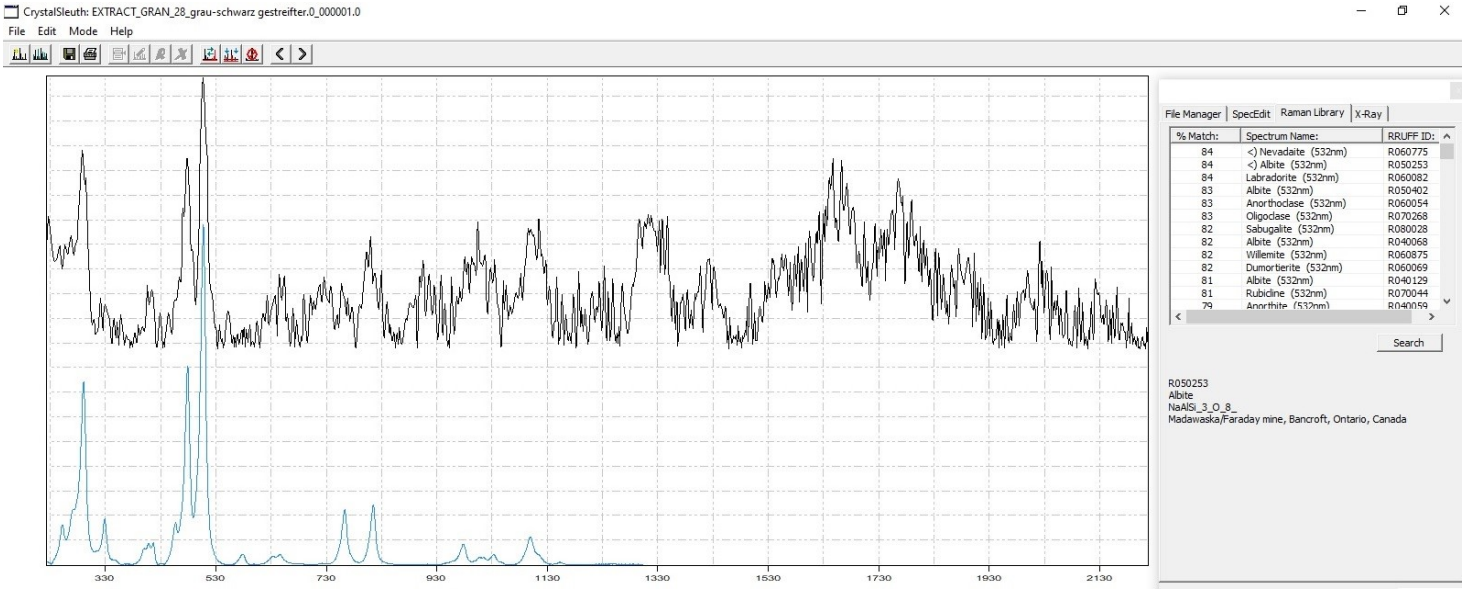
This would indicate a shock pressure

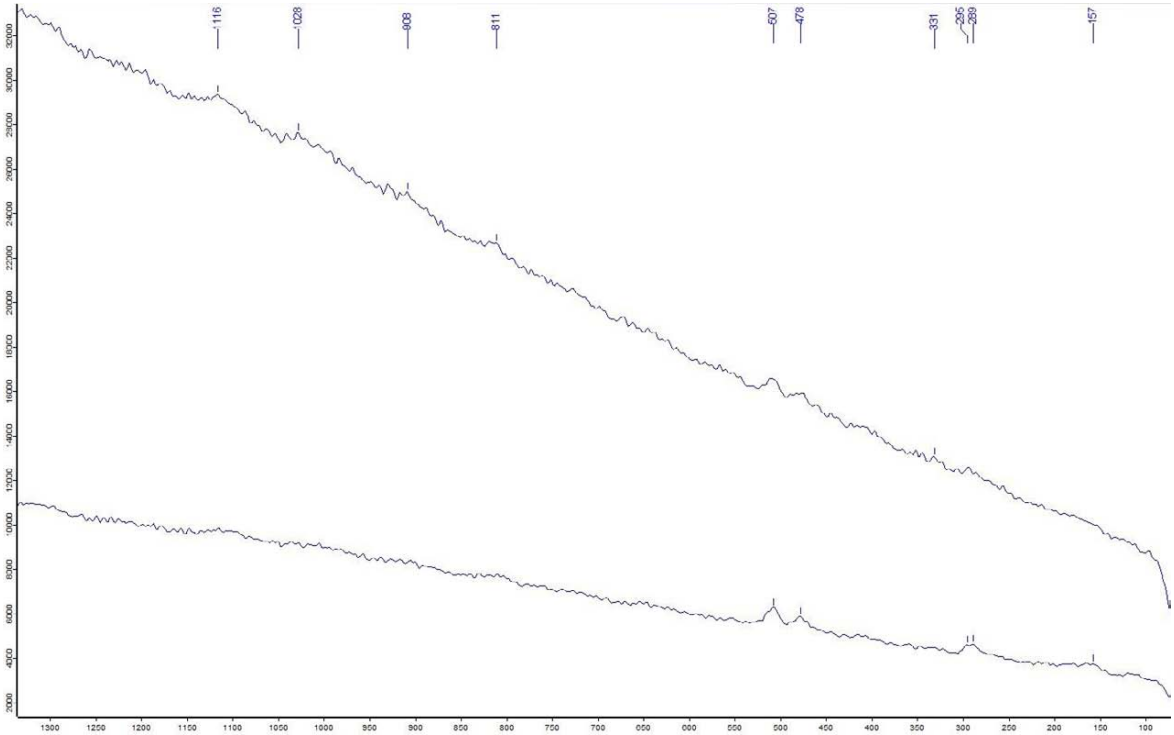
between 5 and 14 GPa

Sample Site 28 : Stone 2_spectra 1 indicates : Albite (→ see RRUFF_CS results)

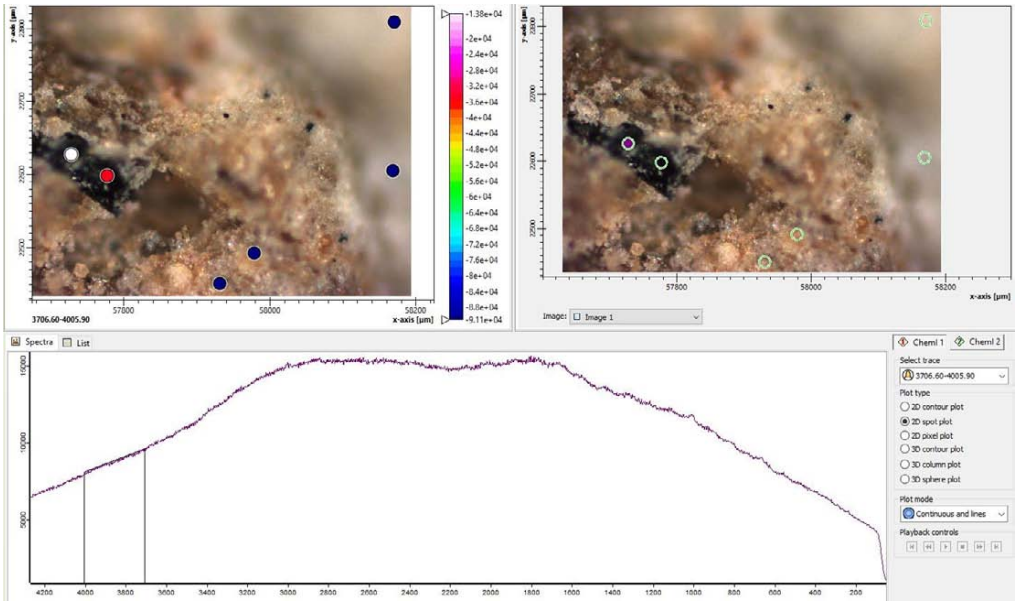


Sample :



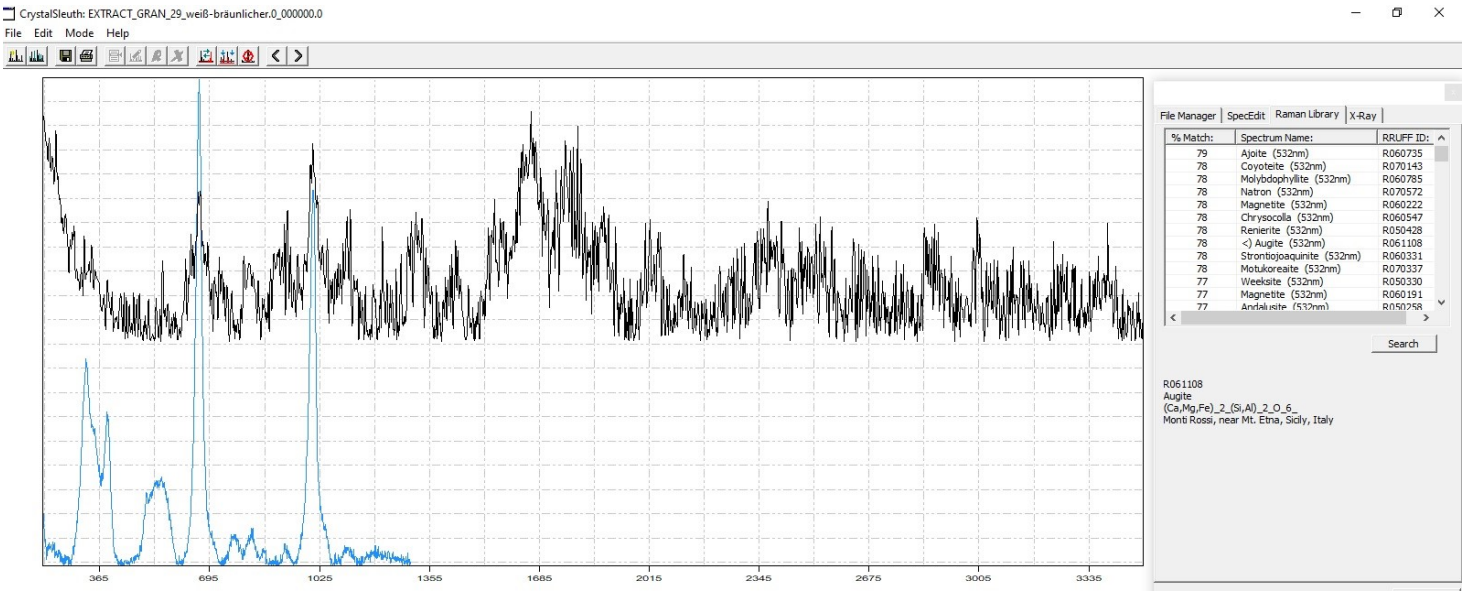


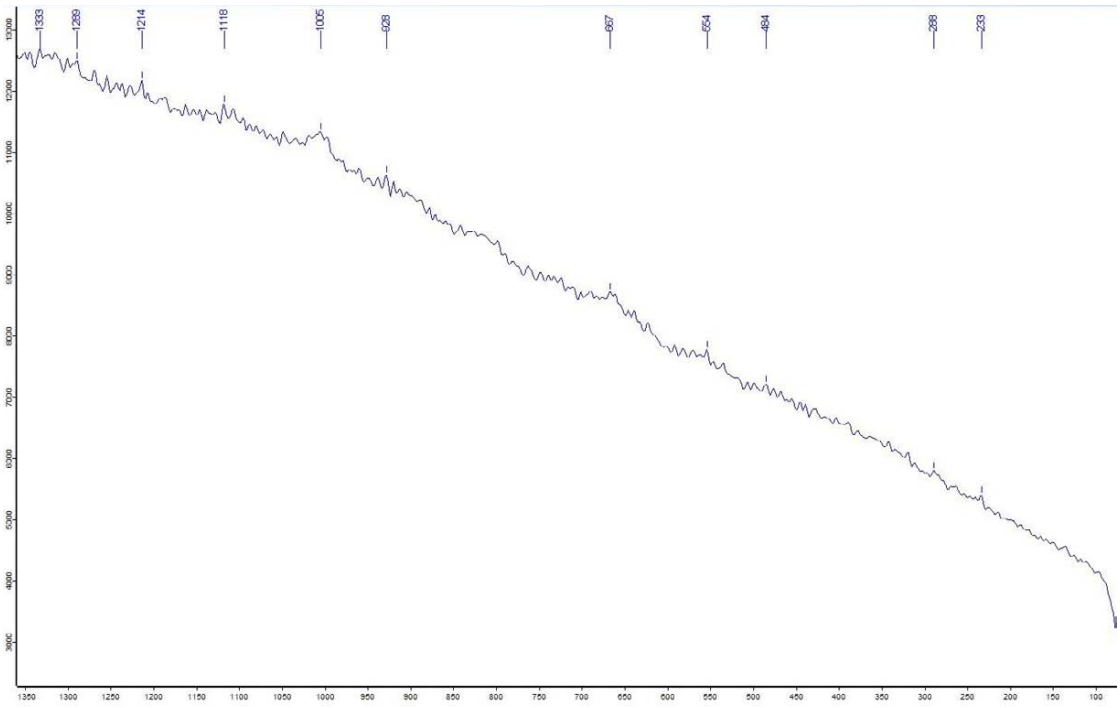
Sample Site 29 : Stone 1_spectra 1 indicates : Augite (→ see RRUFF_CS results)



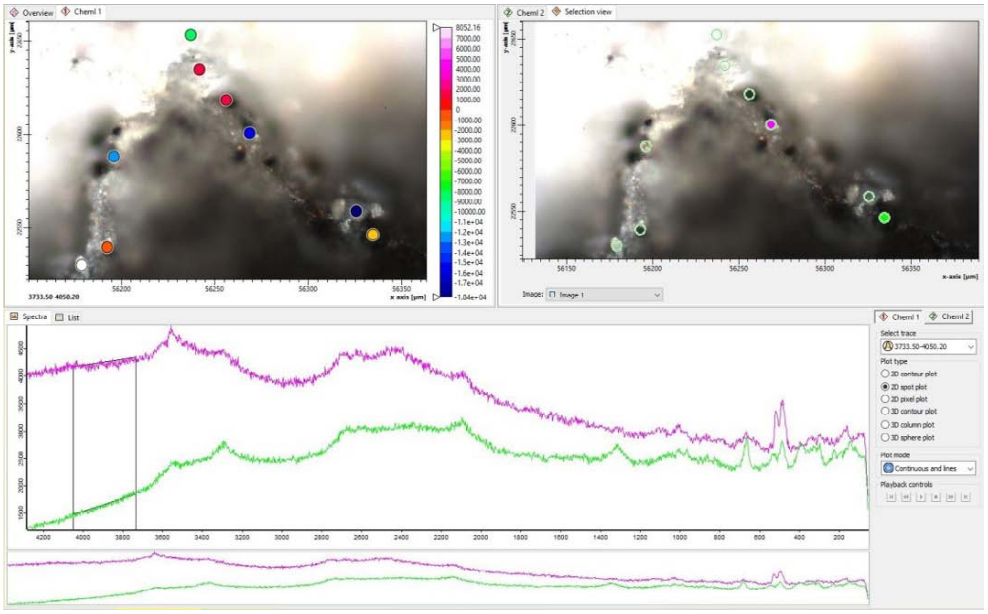
Possible Iron-bearer mineral

Sample :



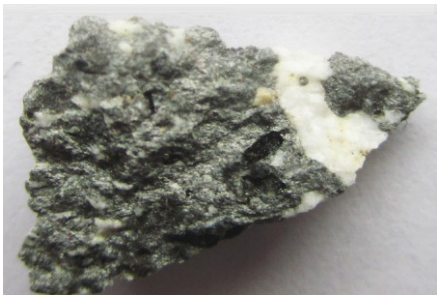


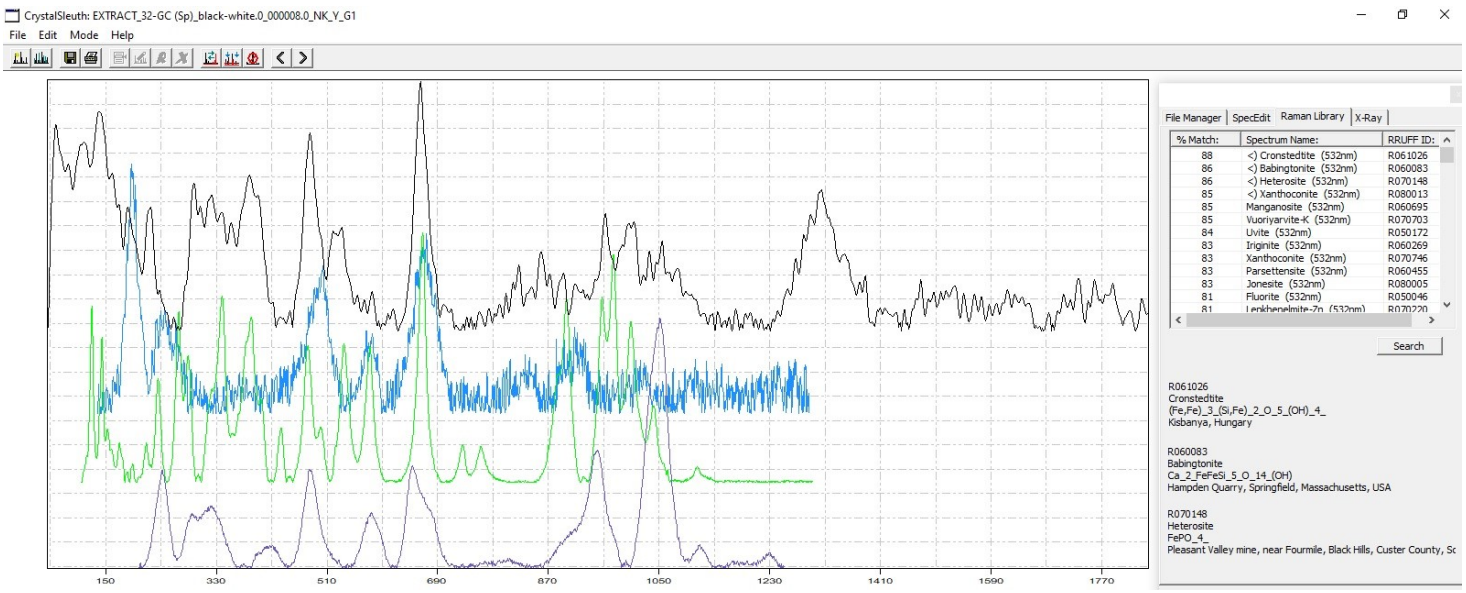
Sample Site 32 : Stone 1_spectra 1 indicates : Cronstedtite_Babingtonite_Heterosite (→ see RRUFF_CS)

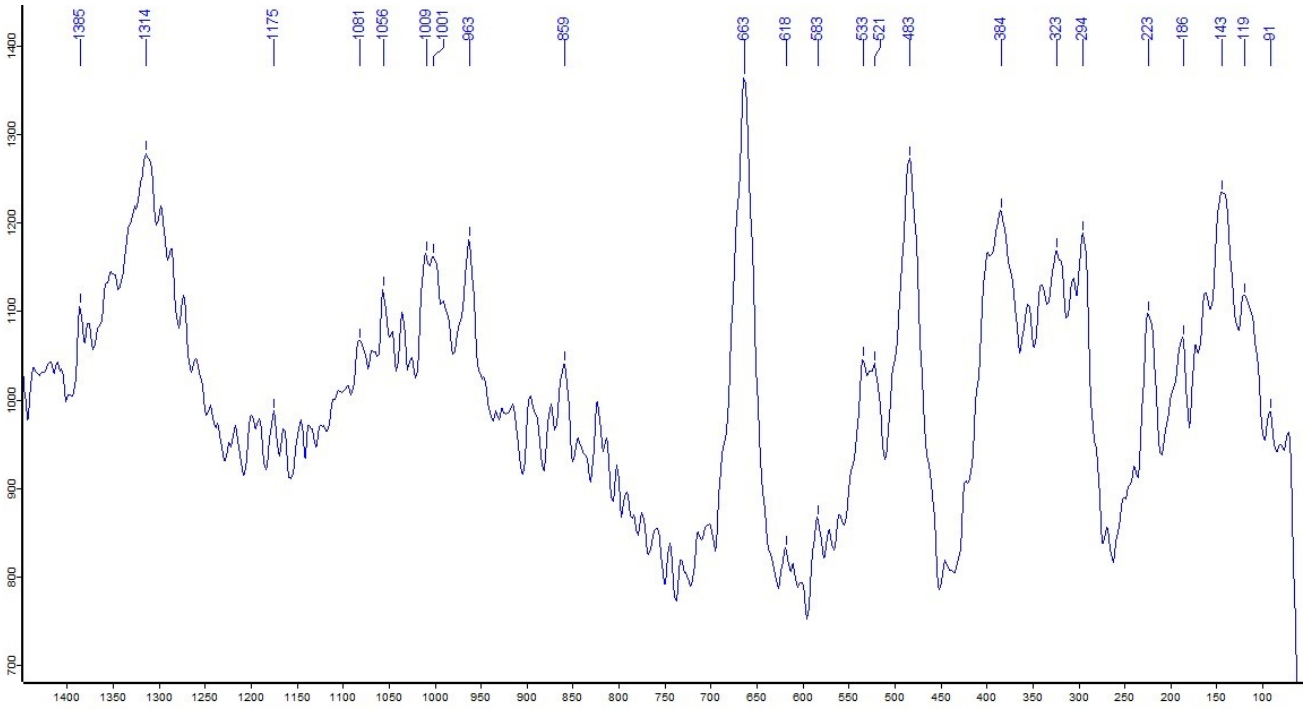


Note : → best matching minerals all iron-bearer minerals !

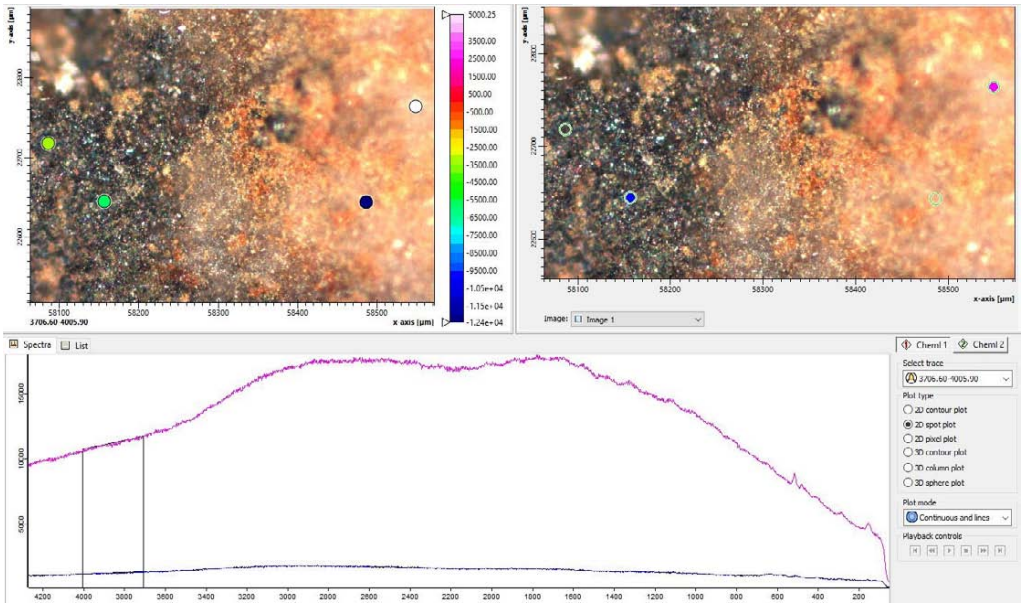
Sample :



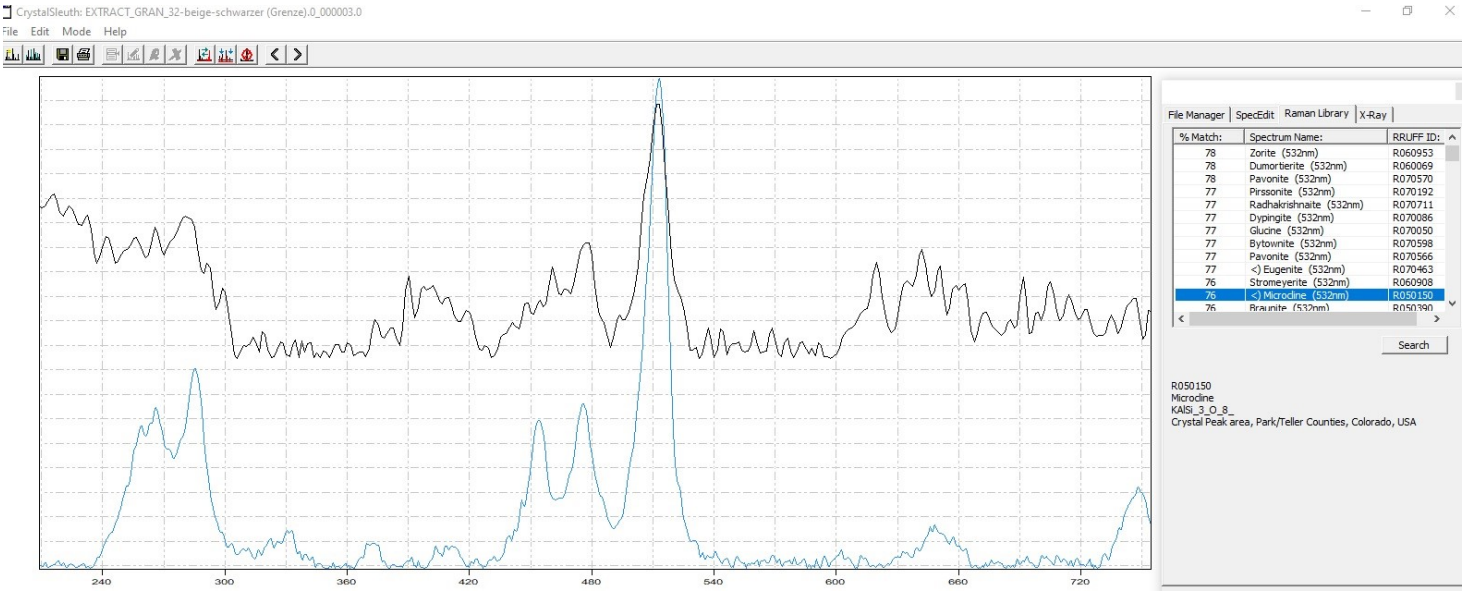


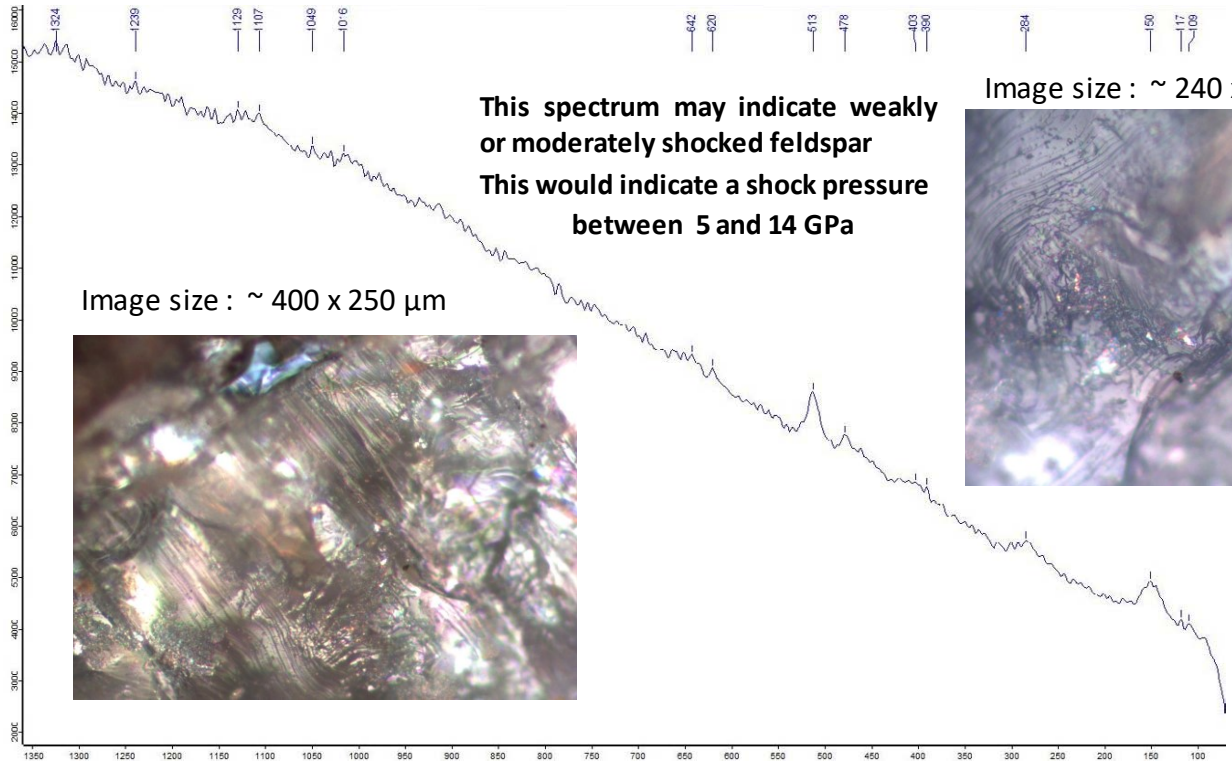


Sample Site 32 : Stone 2_spectra 1 indicates : Microcline (→ see RRUFF_CS results)



Sample :


CrystalSleuth: EXTRACT_GRAN_32-beige-schwarzer (Grenze).0_000003.0
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
78 Zorite (532nm) R060953
78 Dumortierite (532nm) R060069
78 Pavonite (532nm) R070570
77 Pirssonite (532nm) R070192
77 Radhakrishnaite (532nm) R070711
77 Dypingite (532nm) R070086
77 Glucine (532nm) R070050
77 Bytownite (532nm) R070598
77 Pavonite (532nm) R070566
77 <) Eugenite (532nm) R070463
76 Stromeyerite (532nm) R060908
76 <) Microcline (532nm) R050150
Search
R050150
Microcline
KAlSi_3_O_8_
Crystal Peak area, Park/Teller Counties, Colorado, USA

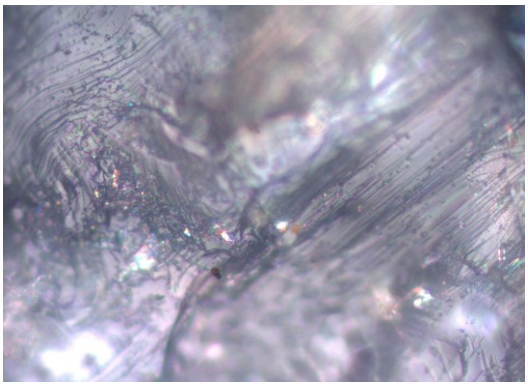


This spectrum may indicate weakly or moderately shocked feldspar

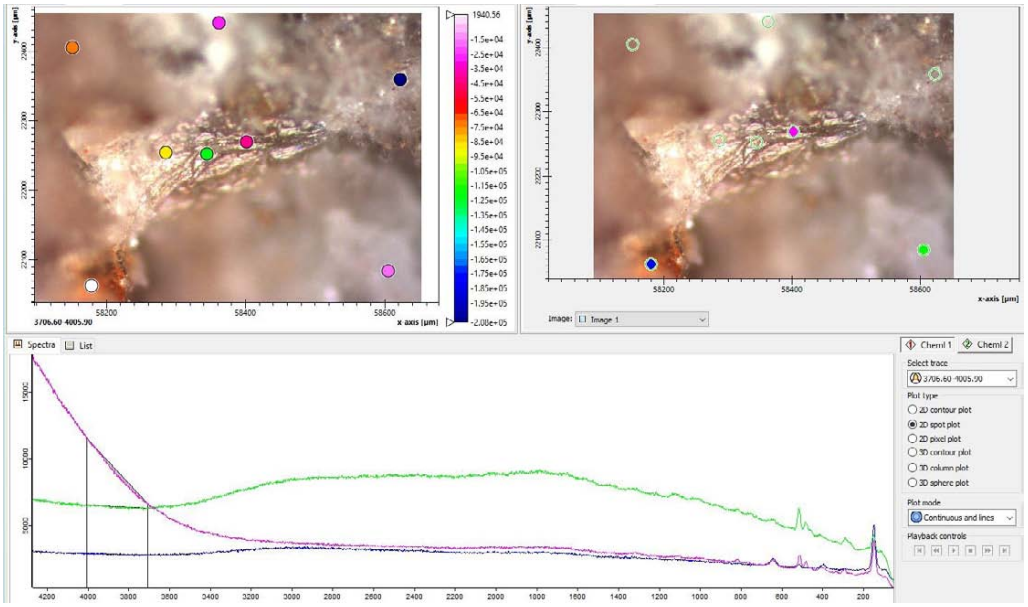
This would indicate a shock pressure between 5 and 14 GPa

Image size : ~ 400 x 250 µm

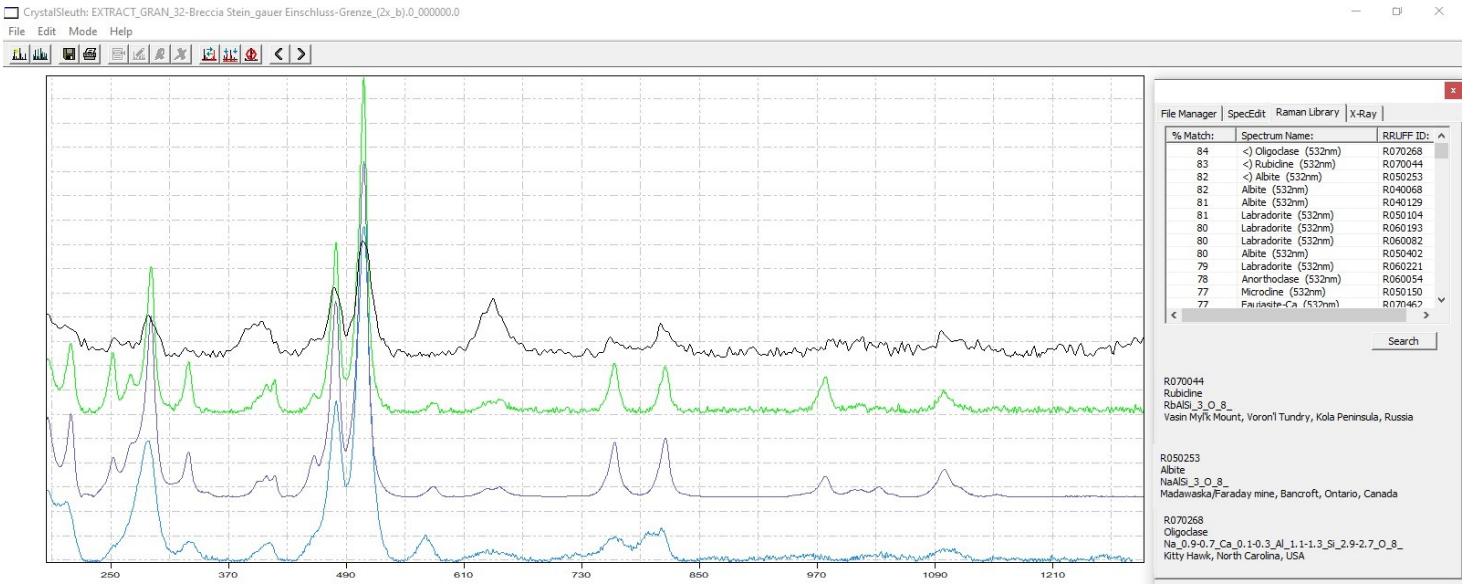
Image size : ~ 240 x 180 µm



Sample Site 32 : Stone 3_spectra 1 indicates : Oligoclase, Rubicline, Albite (→ see RRUFF_CS results)



Sample :



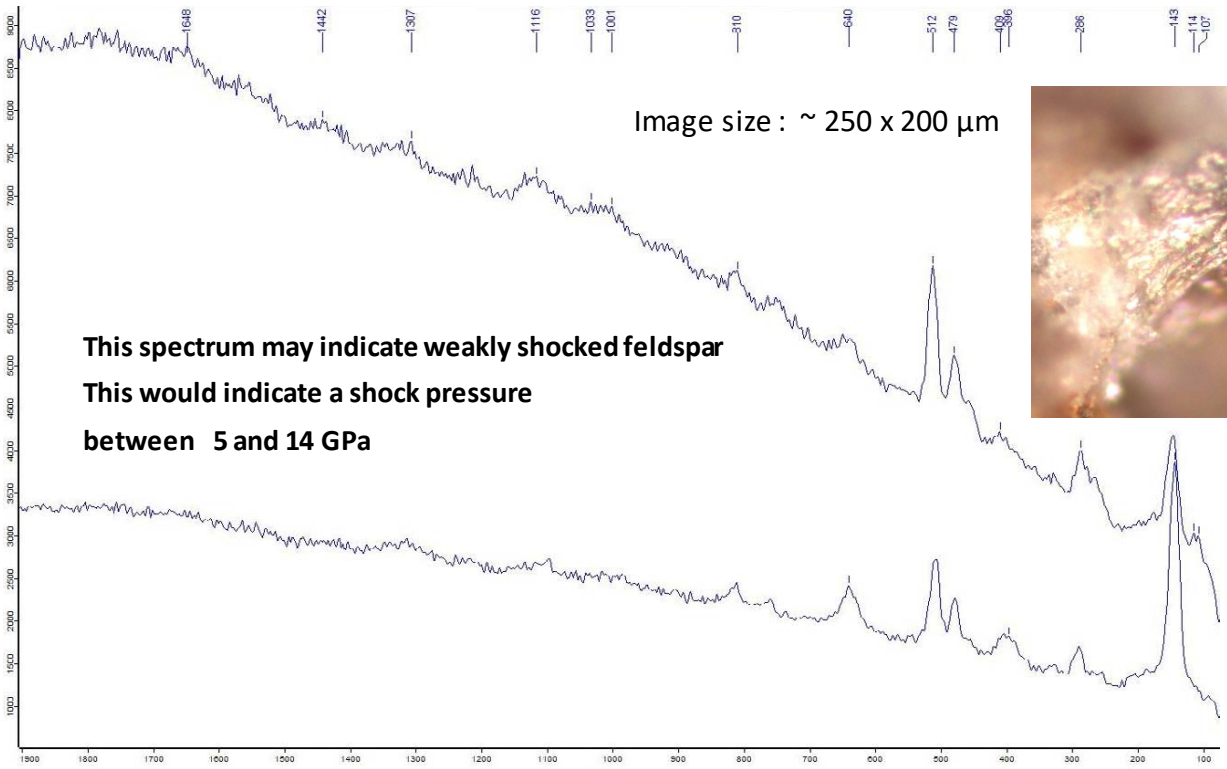
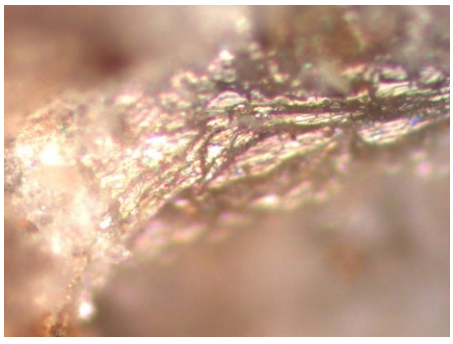


Image size : ~ 250 x 200 µm

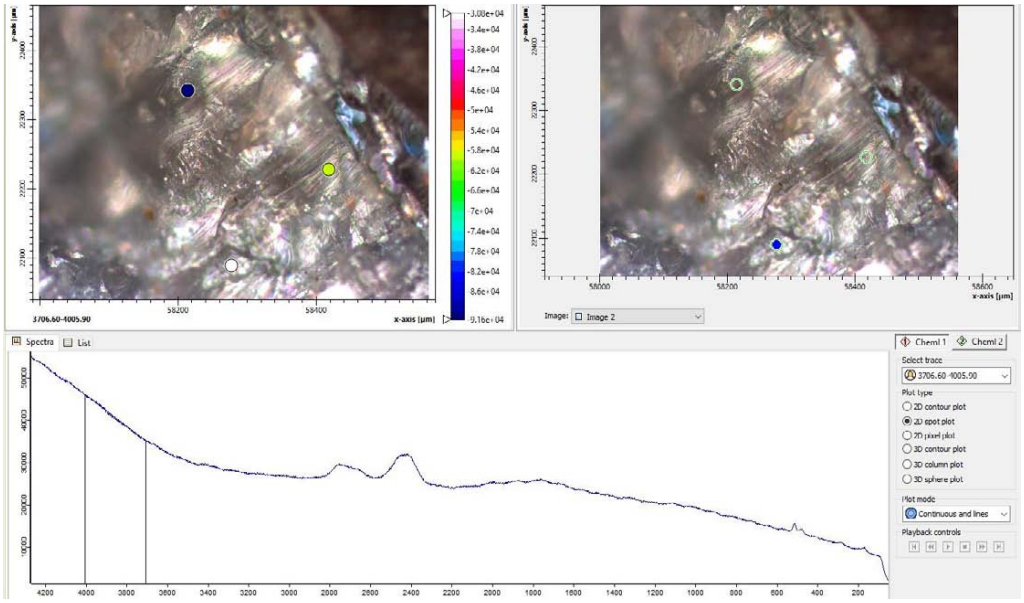


This spectrum may indicate weakly shocked feldspar

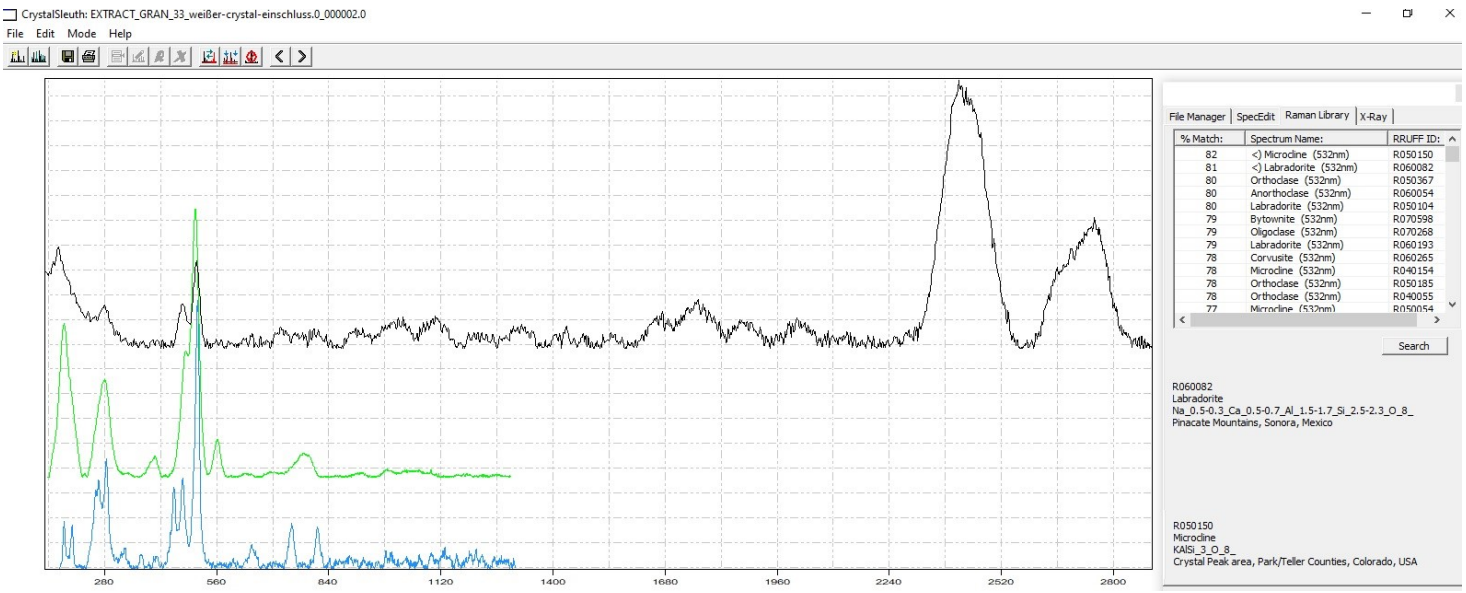
This would indicate a shock pressure

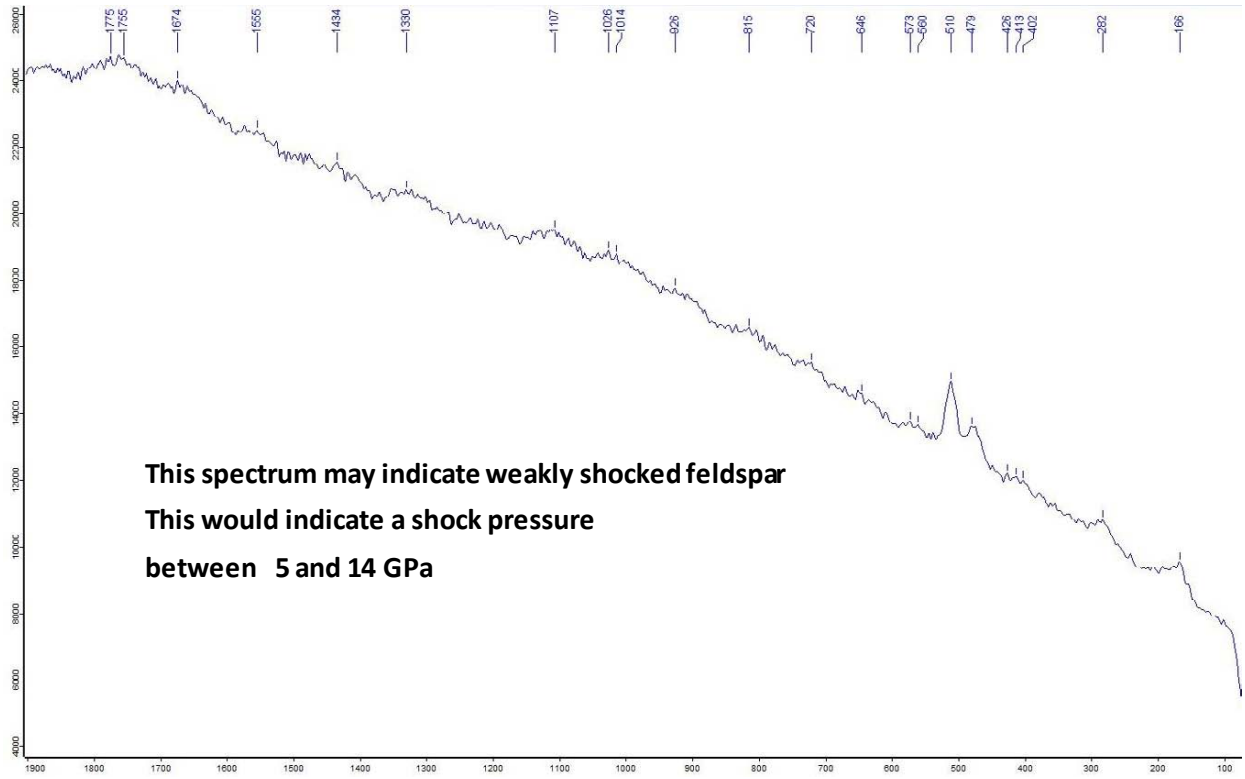
between 5 and 14 GPa

Sample Site 33 : Stone 1 (crystal inclusion)_spectra 1 indicates : Labradorite-Microcline (→ see RRUFF_CS)



Sample :



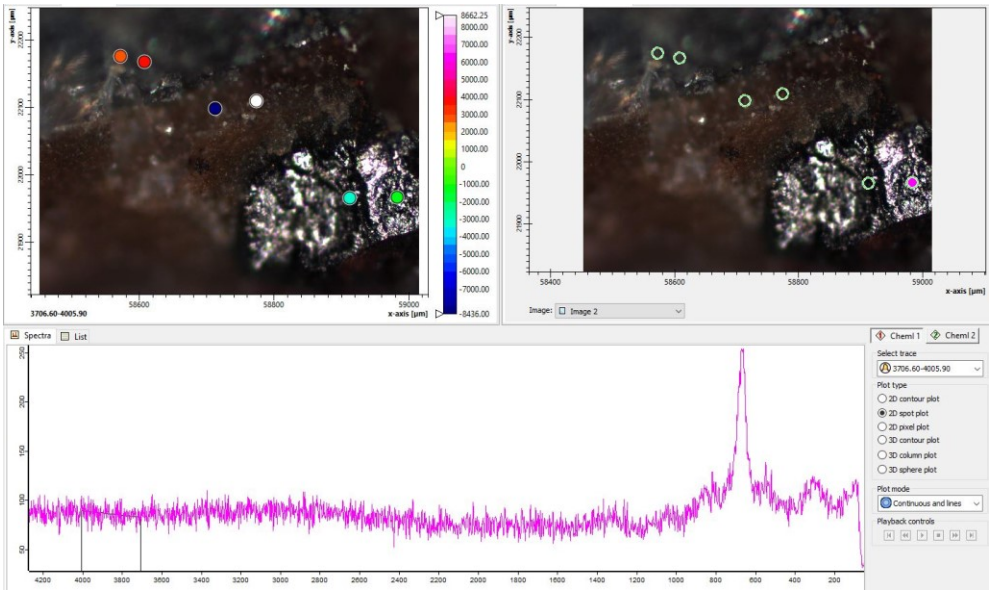


This spectrum may indicate weakly shocked feldspar

This would indicate a shock pressure

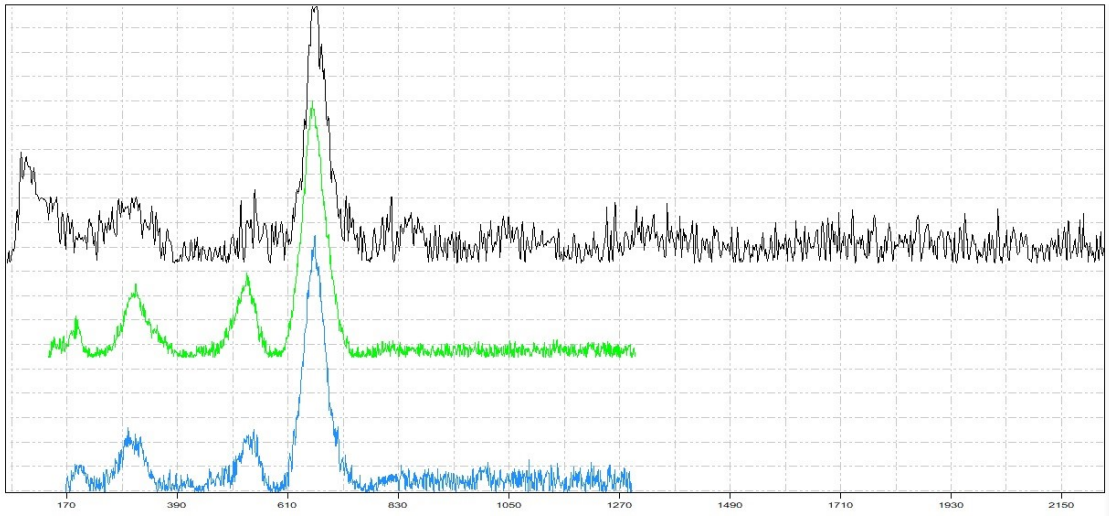
between 5 and 14 GPa

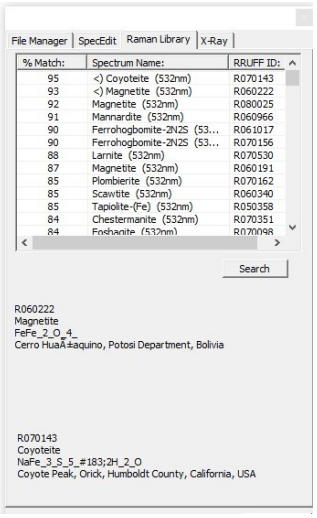
Sample Site 33 : Stone 1 (brown matrix material)_spectra 1 indicates : Magnetite, Coyoteite (RRUFF_CS)

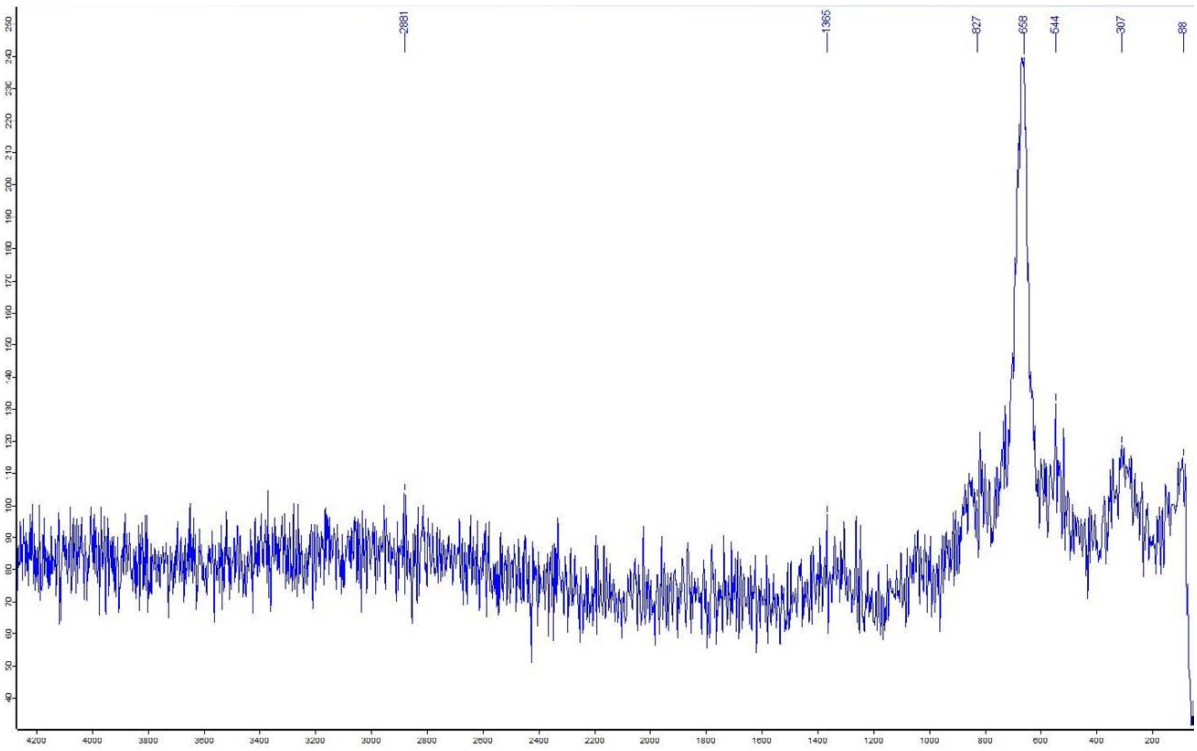


Note : The rock mainly consists of Magnetite ! (or Coyoteite) → iron-bearer minerals

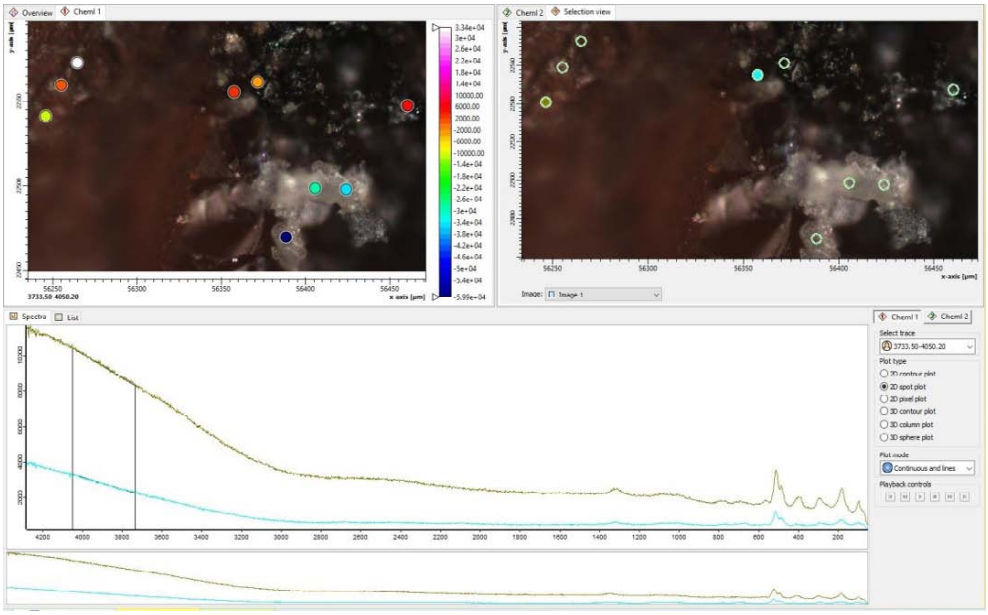
Sample :



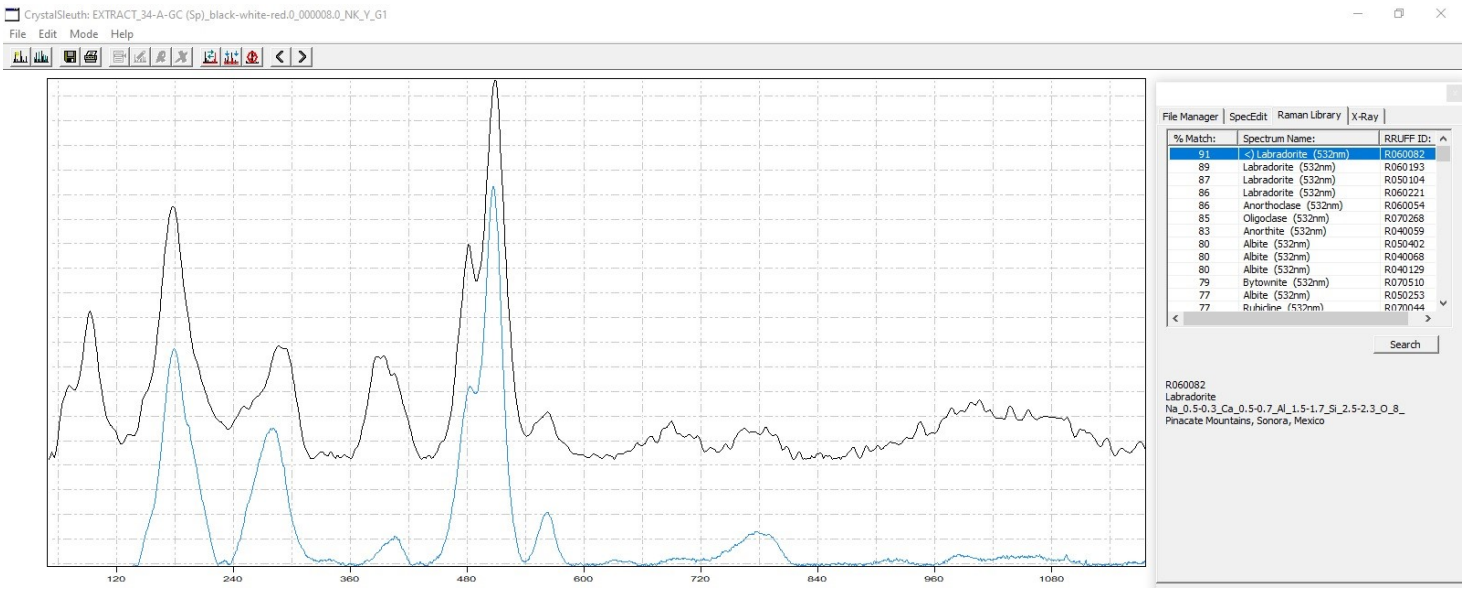


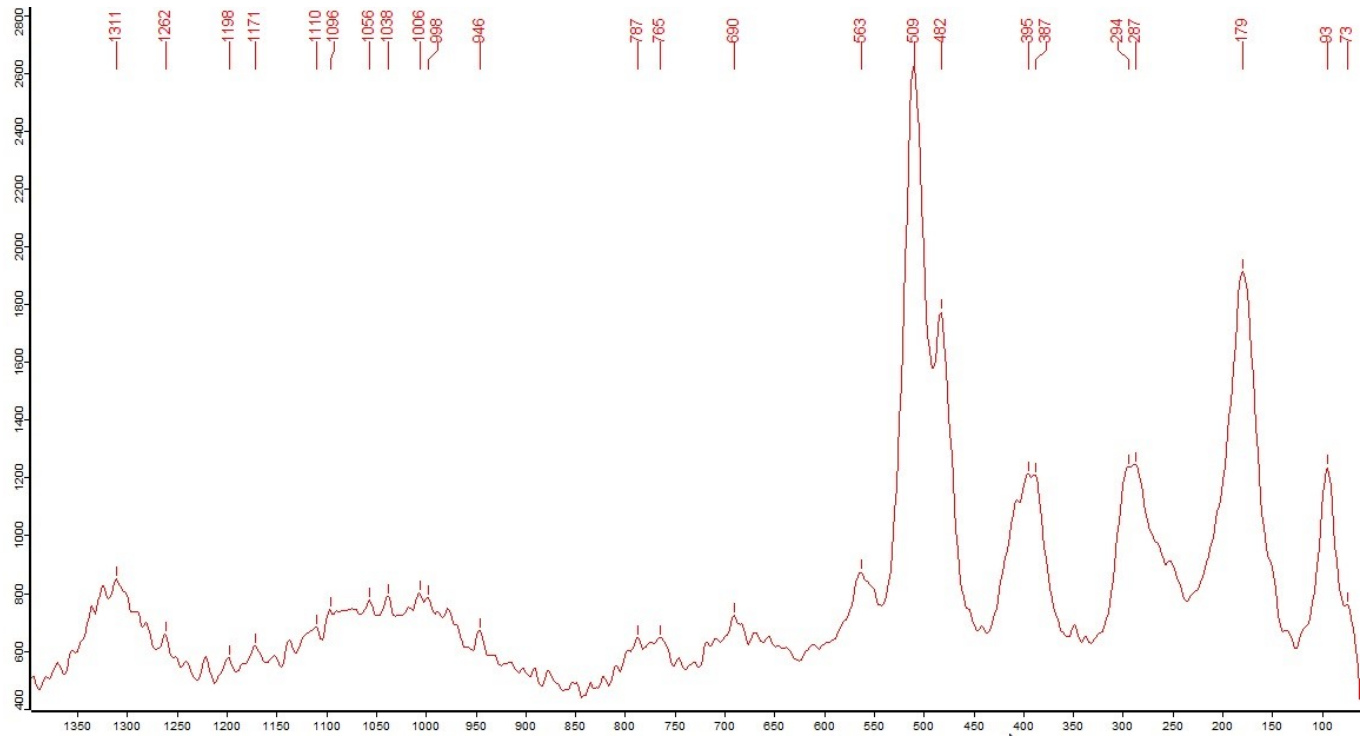


Sample Site 34-A : Stone 1_spectra 1 indicates : Labradorite (→ see RRUFF_CS)

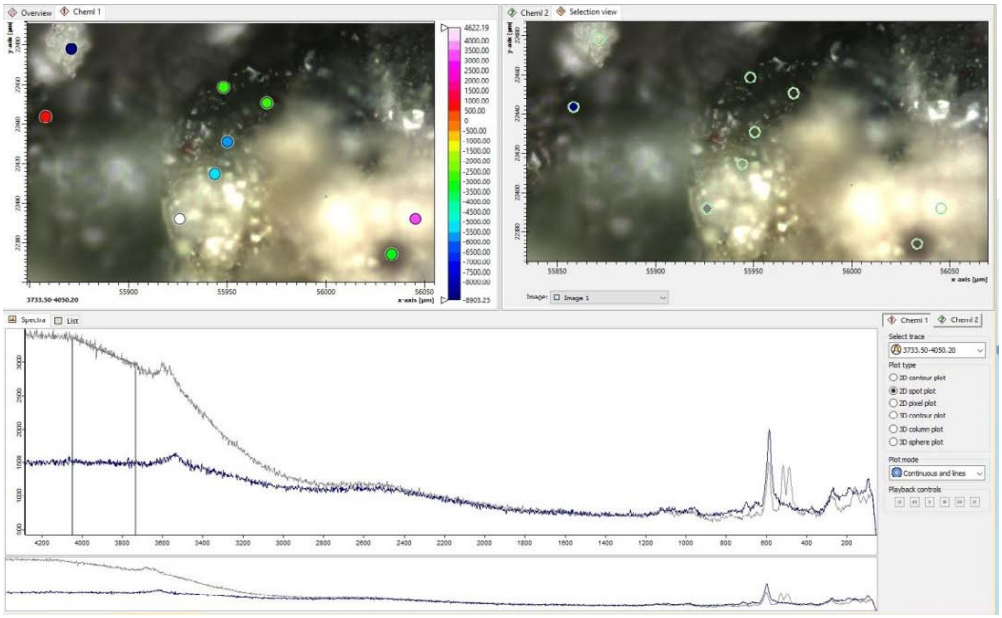


Sample :

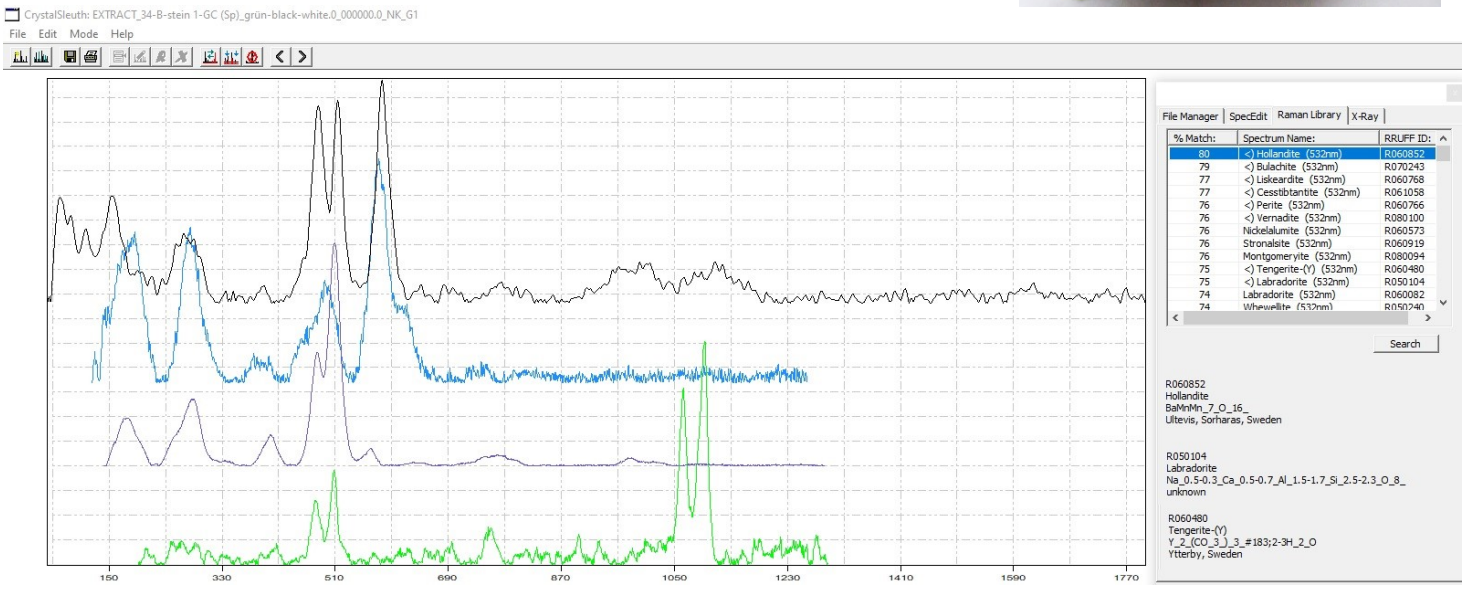


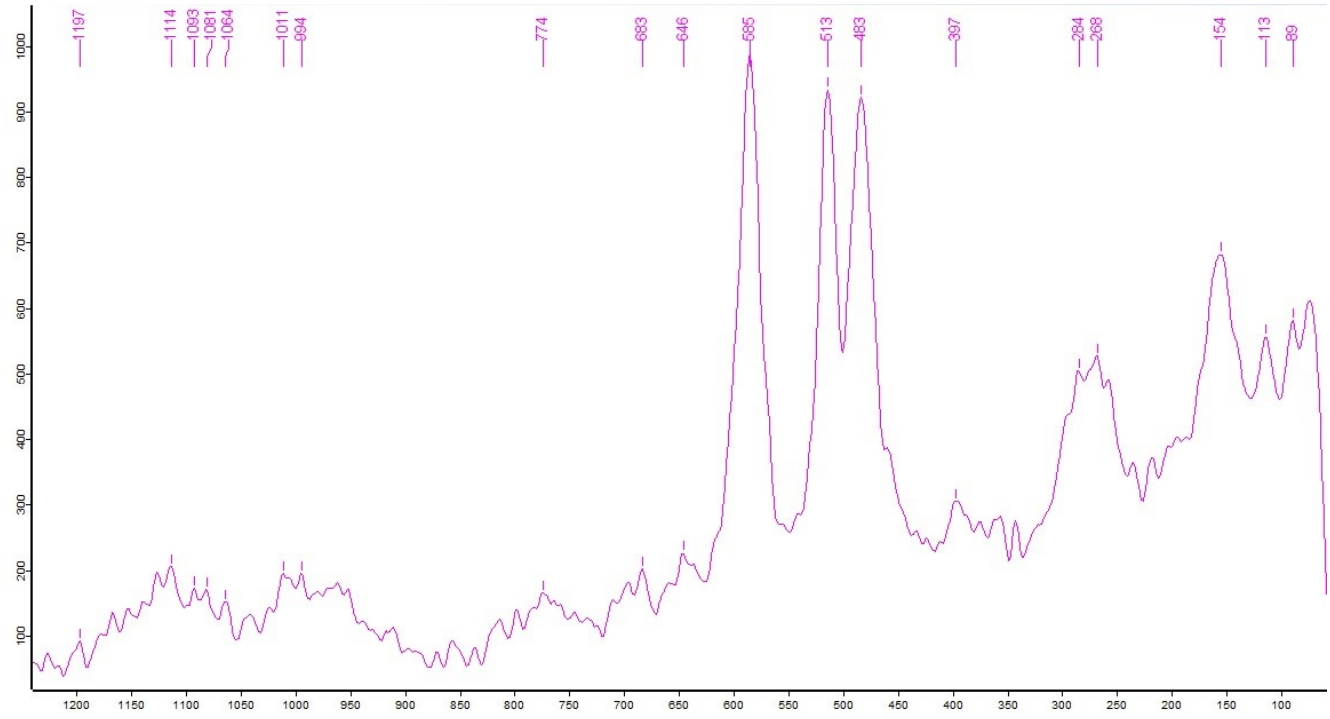


Sample Site 34-B : Stone 1_spectra 1 indicates : Hollandite, Labradorite, Tengerite-(Y) (→ see RRUFF_CS)



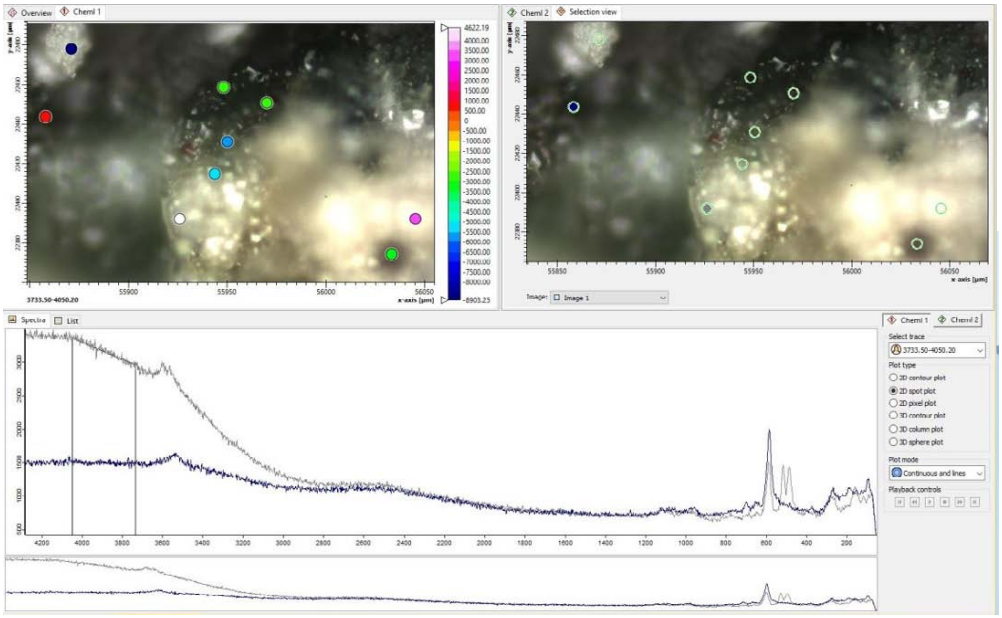
Sample :



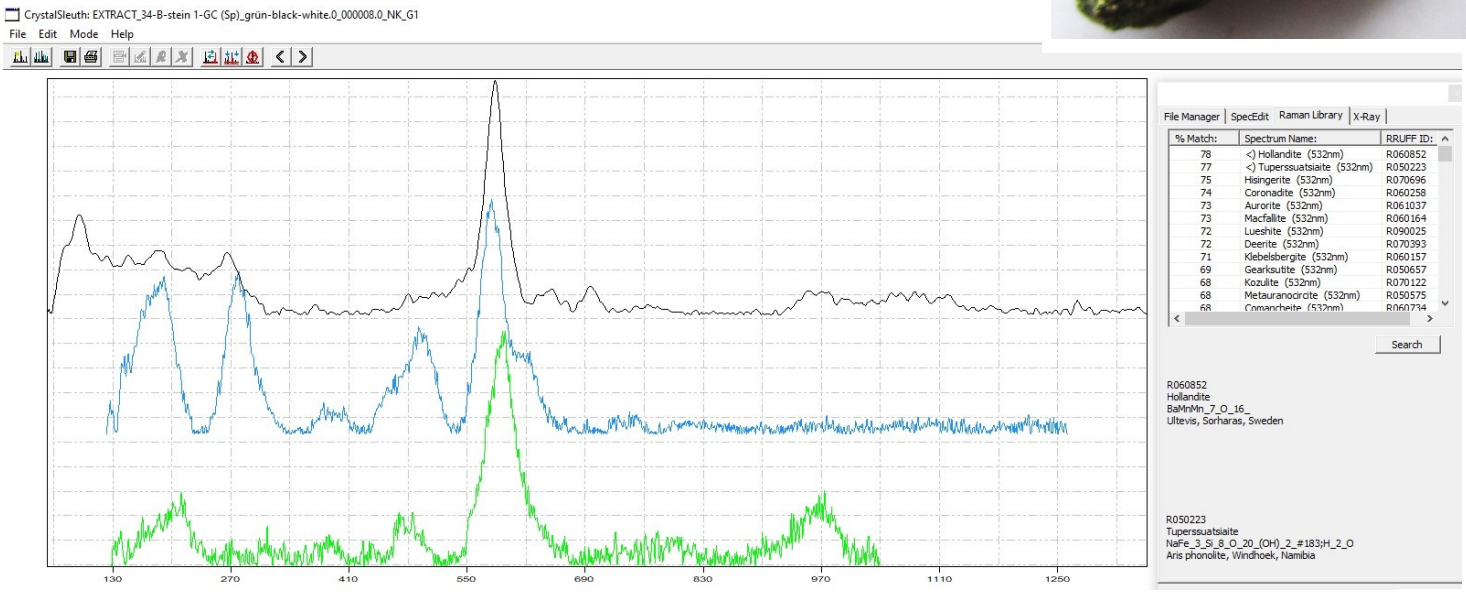


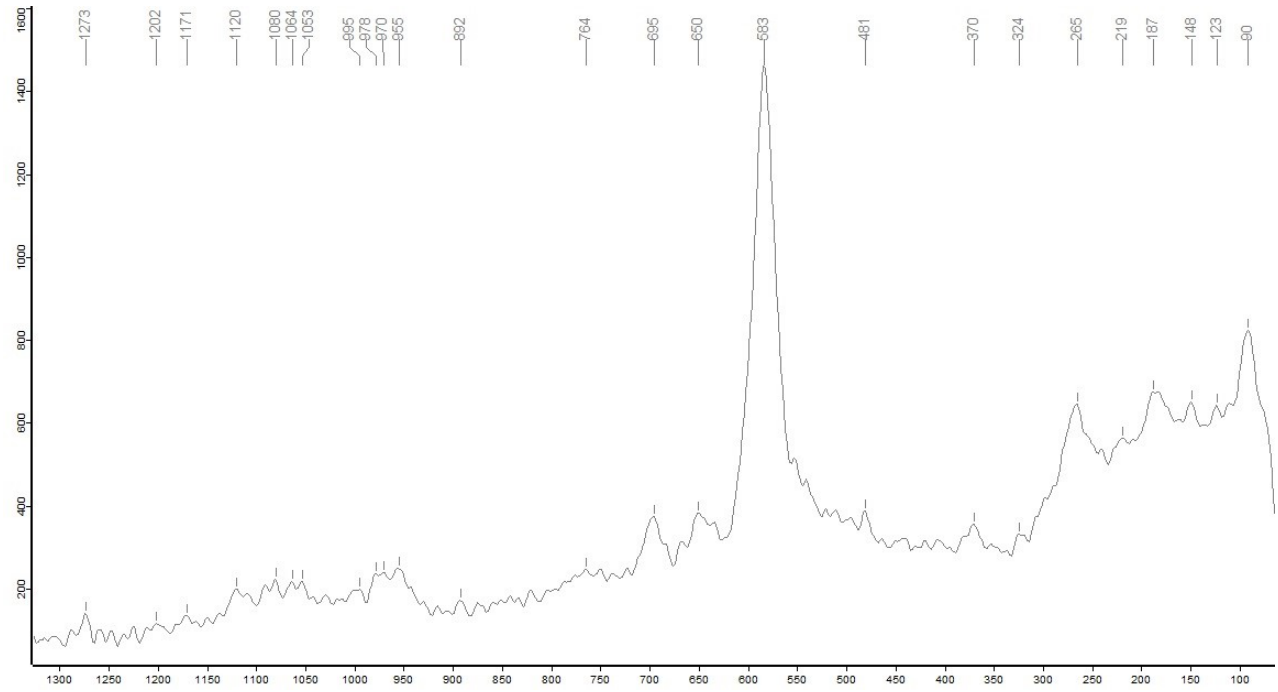
Sample Site 34-B : Stone 1_spectra 2 indicates : Hollandite,Tuperssuatsiaite (→ see RRUFF_CS)

Iron- or mangan bearer mineral

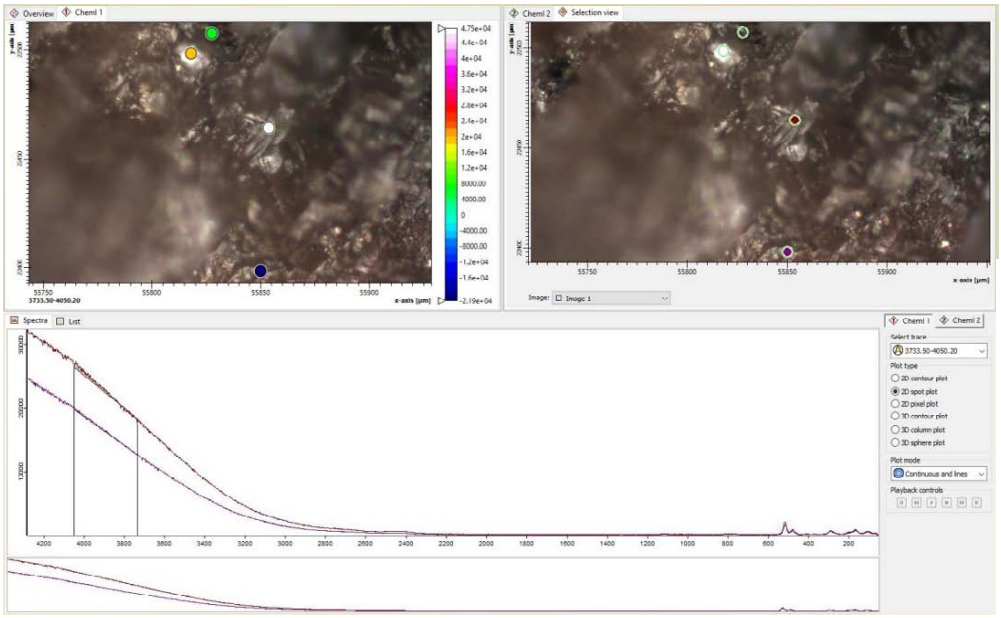


Sample :

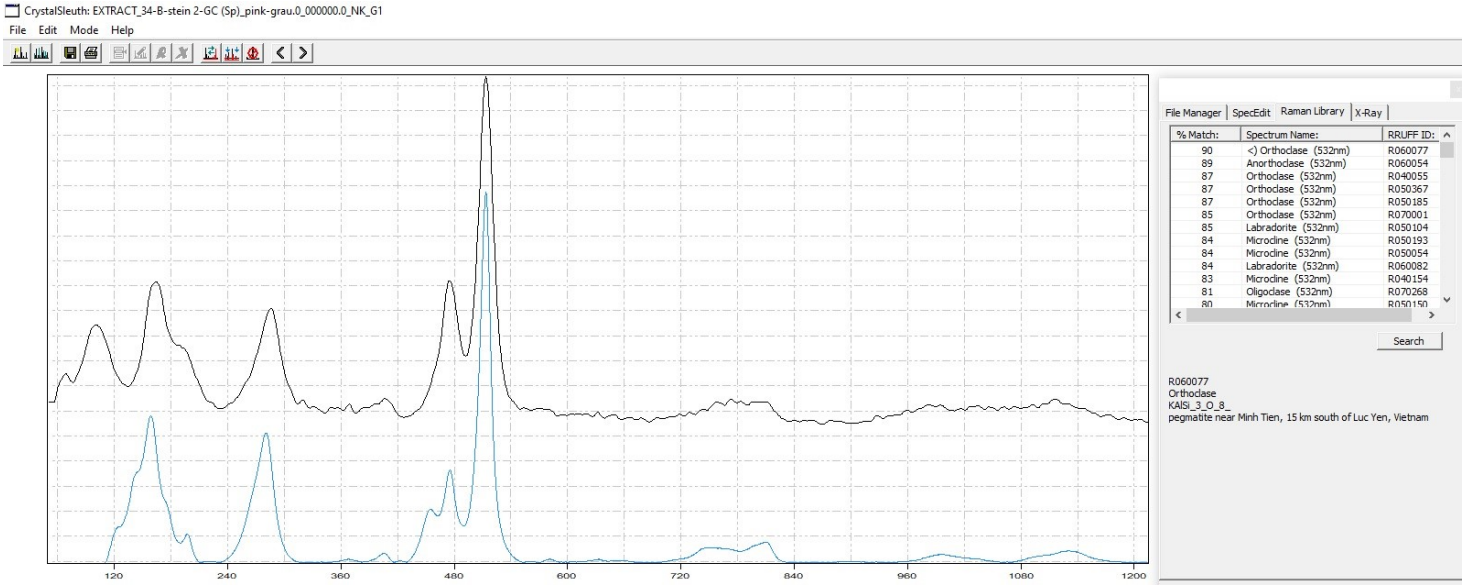


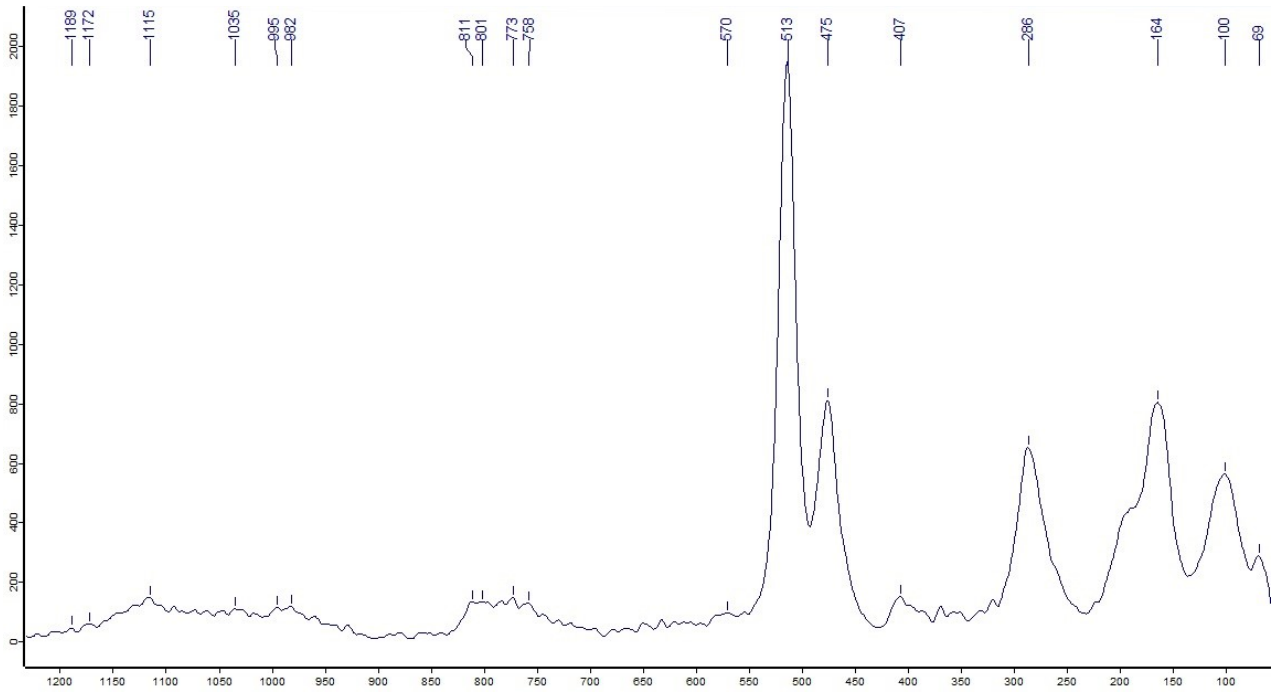


Sample Site 34-B : Stone 2_spectra 1 indicates : Orthoclase (→ see RRUFF_CS)

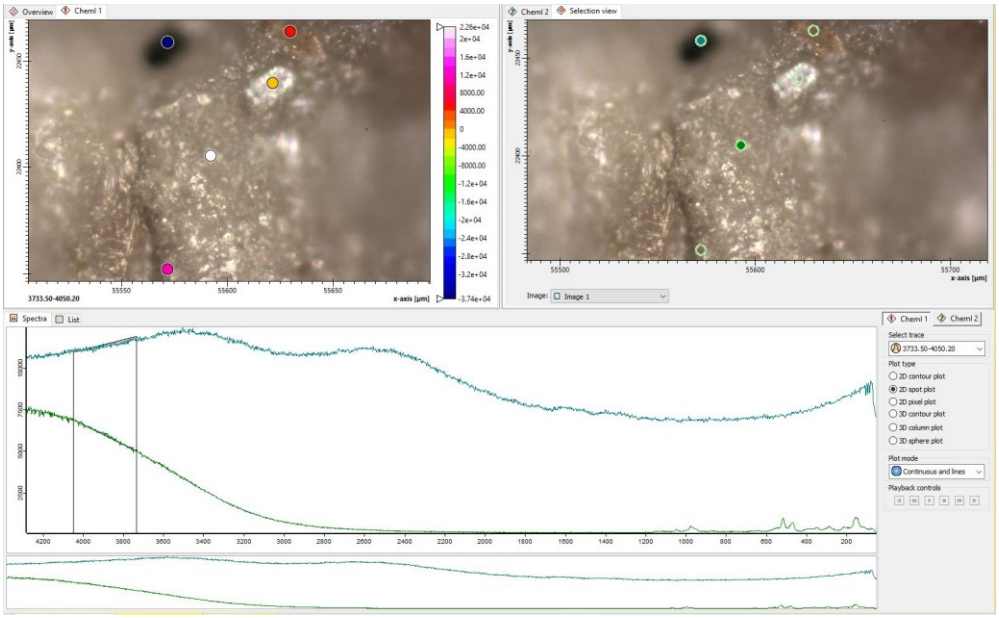


Sample :

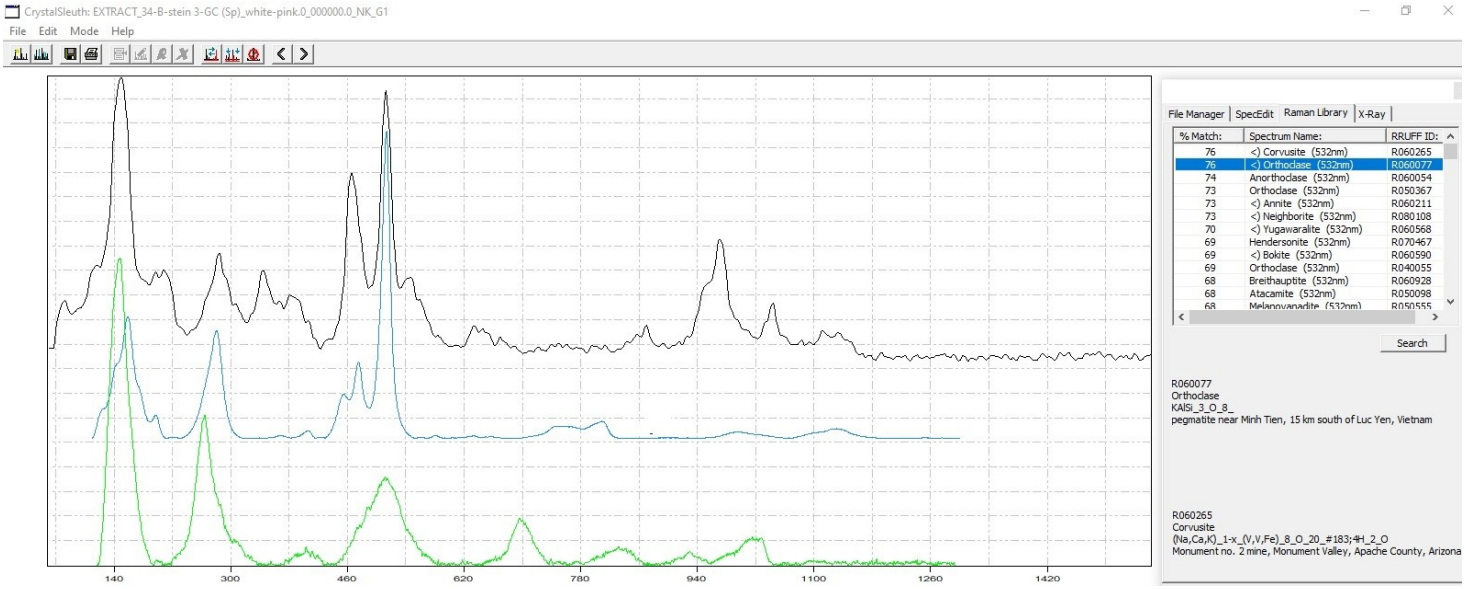

CrystalSleuth: EXTRACT_34-B-stein 2-GC (Sp)_pink-grau.0_000000.0_NK_G1
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
90 <) Orthoclase (532nm) R060077
89 Anorthoclase (532nm) R060054
87 Orthoclase (532nm) R040055
87 Orthoclase (532nm) R050367
87 Orthoclase (532nm) R050185
85 Orthoclase (532nm) R070001
85 Labradorite (532nm) R050104
84 Microcline (532nm) R050193
84 Microcline (532nm) R050054
84 Labradorite (532nm) R060082
83 Microcline (532nm) R040154
81 Oligoclase (532nm) R070268
Search
R060077
Orthoclase
KAlSi_3_O_8_
pegmatite near Minh Tien, 15 km south of Luc Yen, Vietnam

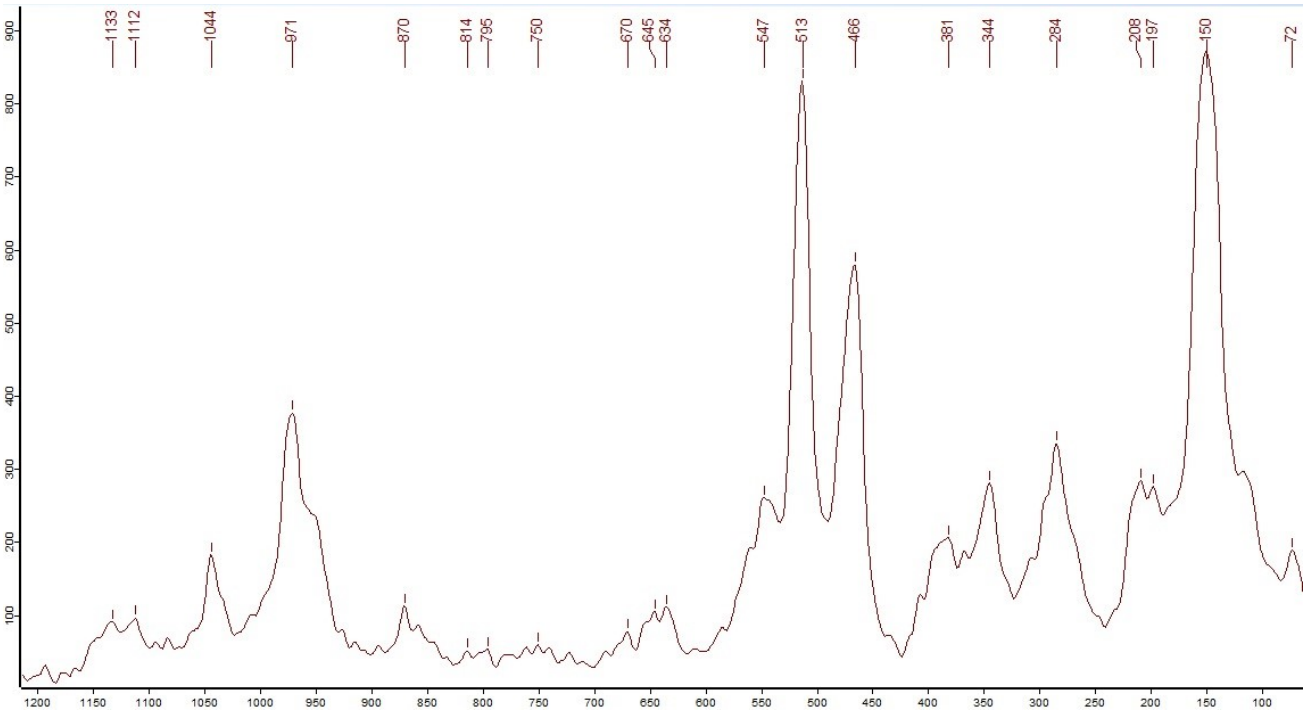


Sample Site 34-B : Stone 3_spectra 1 indicates : Orthoclase, Corvusite (→ see RRUFF_CS)

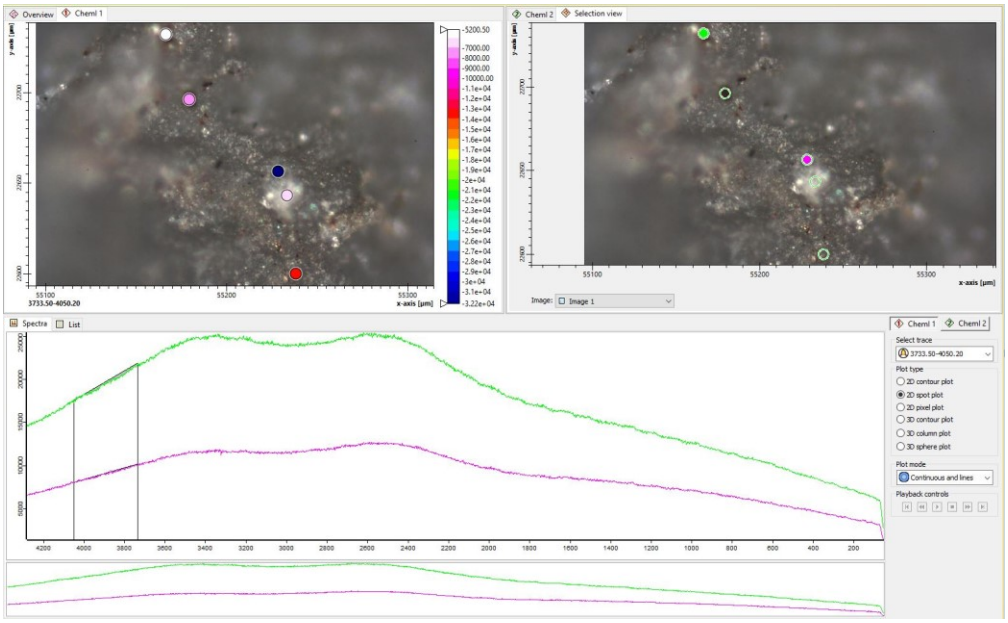


Sample :


CrystalSleuth: EXTRACT_34-B-stein 3-GC (Sp)_white-pink.0_000000.0_NK_G1
File Edit Mode Help
File Manager | SpecEdit | Raman Library | X-Ray
% Match: | Spectrum Name: | RRUFF ID:
76 <) Corvusite (532nm) R060265
76 <) Orthoclase (532nm) R060077
74 Anorthoclase (532nm) R060054
73 Orthoclase (532nm) R050367
73 <) Annite (532nm) R060211
73 <) Neighborite (532nm) R080108
70 <) Yugawaralite (532nm) R060568
69 Hendersonite (532nm) R070467
69 <) Bokite (532nm) R060590
69 Orthoclase (532nm) R040055
68 Breithauptite (532nm) R060928
68 Atacamite (532nm) R050098
Search
R060077
Orthoclase
KAlSi_3_O_8_
pegmatite near Minh Tien, 15 km south of Luc Yen, Vietnam
R060265
Corvusite
(Na,Ca,K)_1-x_(V,V,Fe)_8_O_20_·#183;4H_2_O
Monument no. 2 mine, Monument Valley, Apache County, Arizona



Sample Site 36 : Stone 1_spectra 1 indicates : no usable result from this spectra



Sample :

Appendix 1 : Photos of the rock samples from the sites : 14, 20 & 25, 28, 29, 32, 33 & 34-B

→ See next page

Note : Photos of the Sites 14, 20 & 25, 28, 29, 32, 33 & 34-B and other sample sites are available on my website. → : Sample Sites "Tejeda Crater" (or here) together with geological maps and a GPS-Data List of the sample sites.

Geological maps of selected sample areas :

→ Weblink to the Magna 50 (1:50000)

Digital Geological-Map :

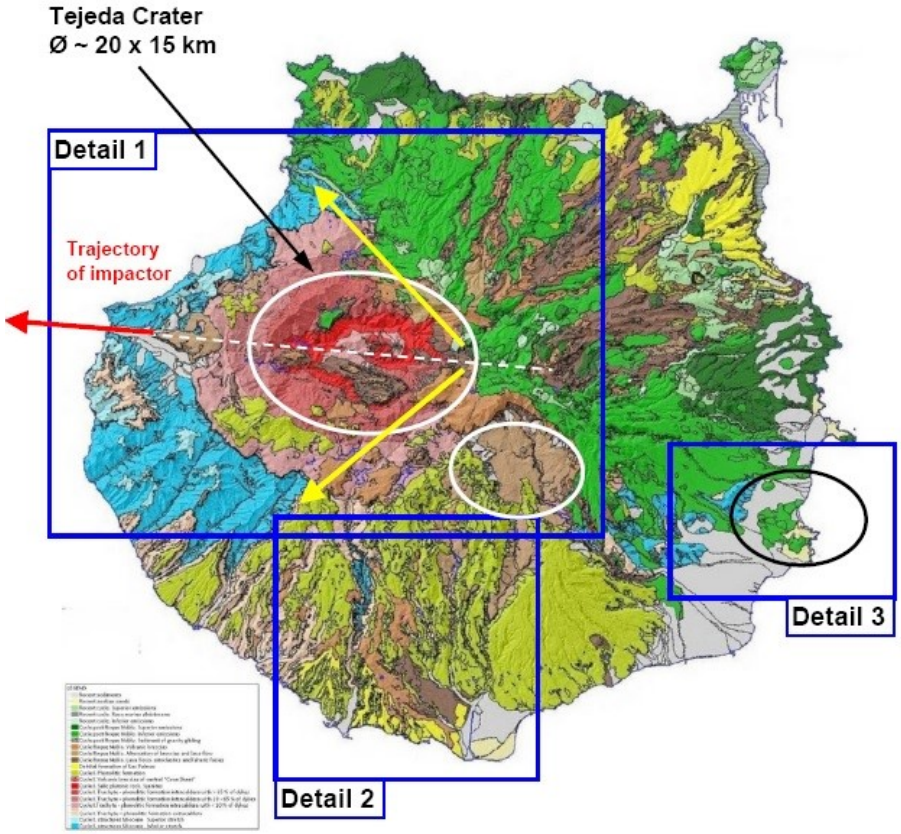
→ Gran Canaria (Hoja 1109)

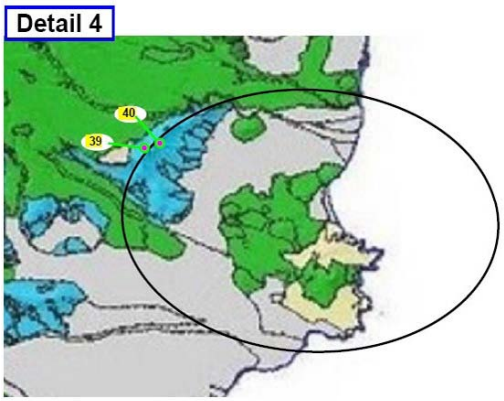
or

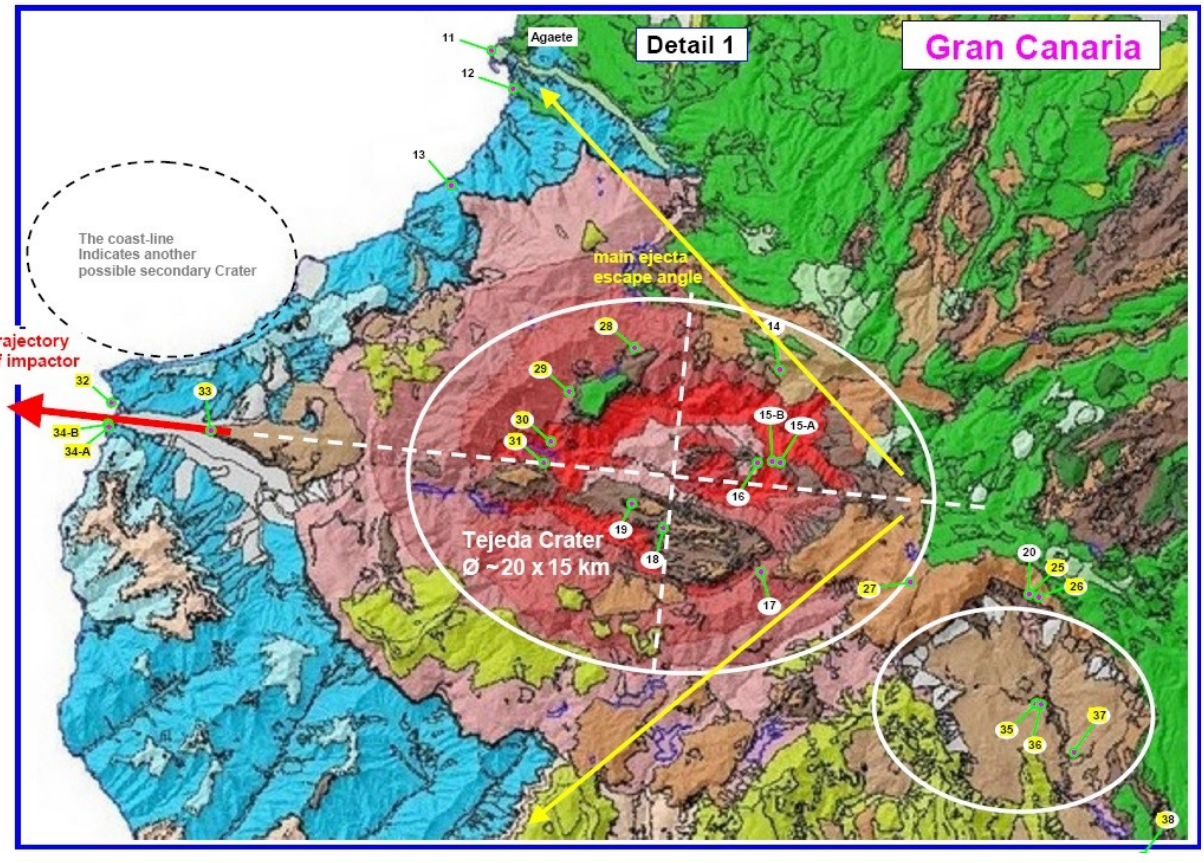
general entry to the maps :

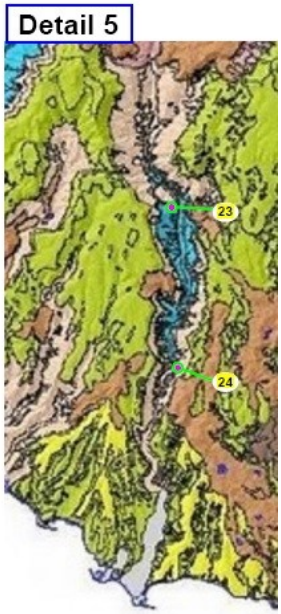
→ Magna 50 - GEO-Maps

→ zoom-in to Gran Canaria



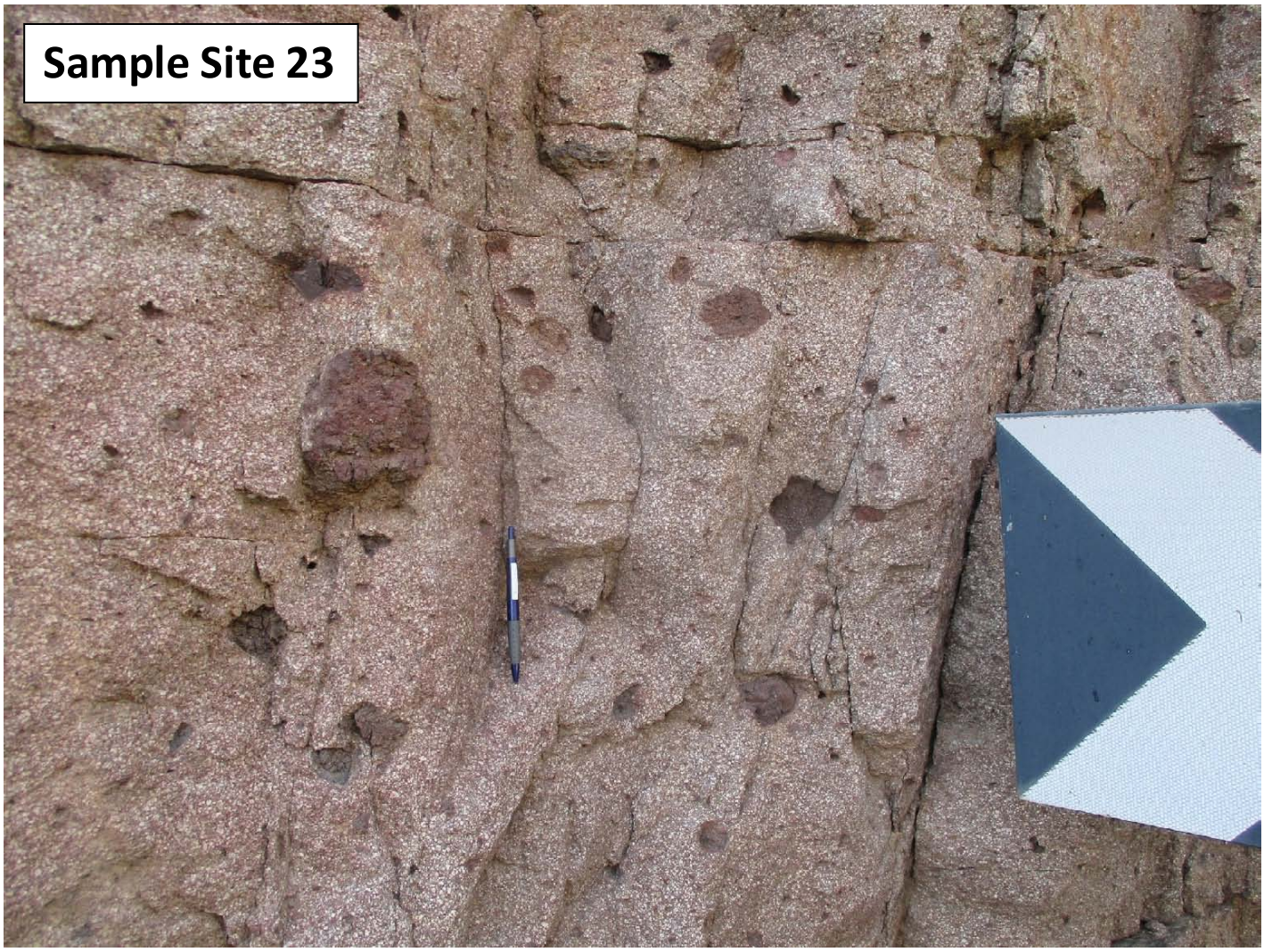




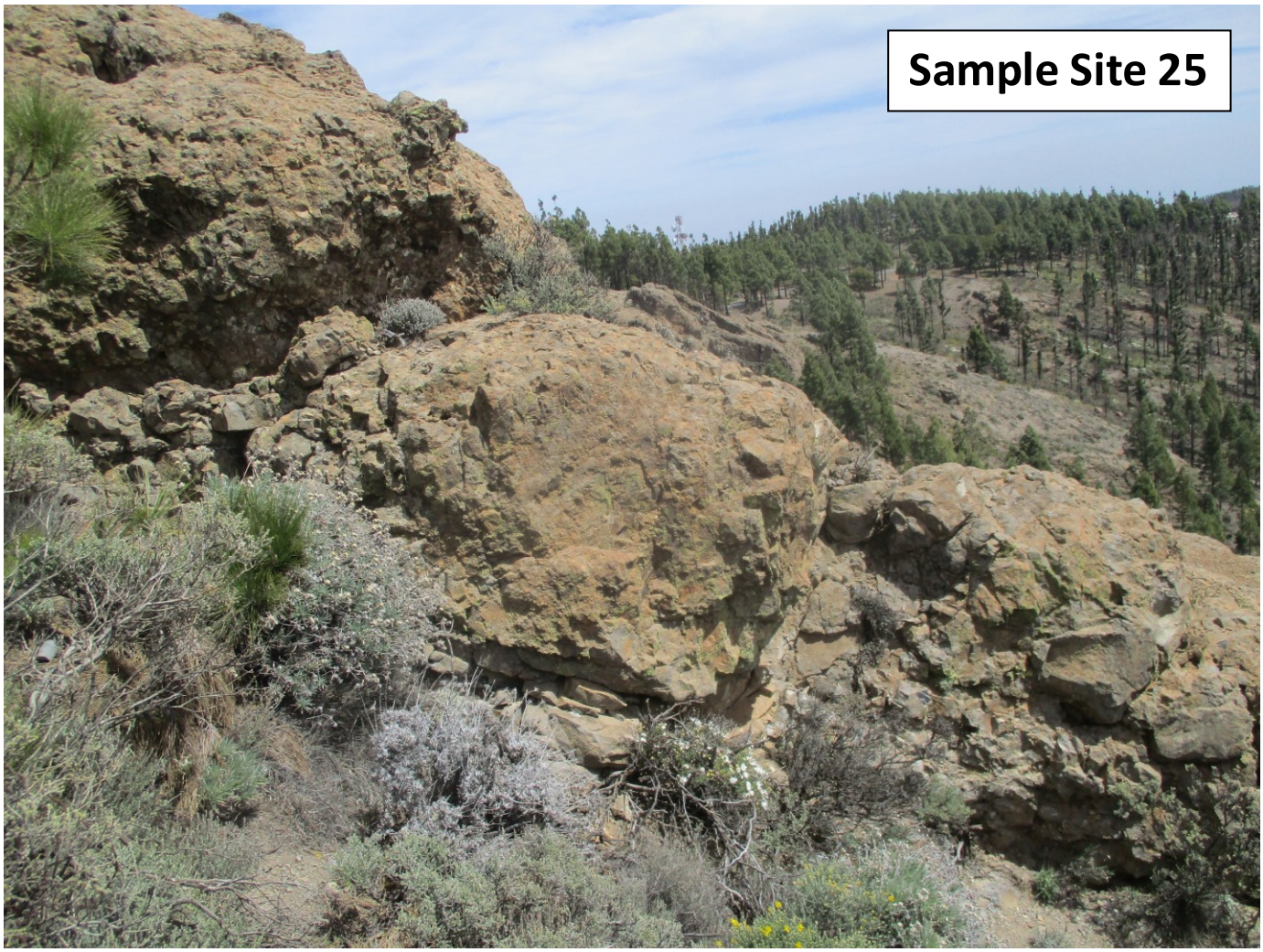


Sample Site 15-A

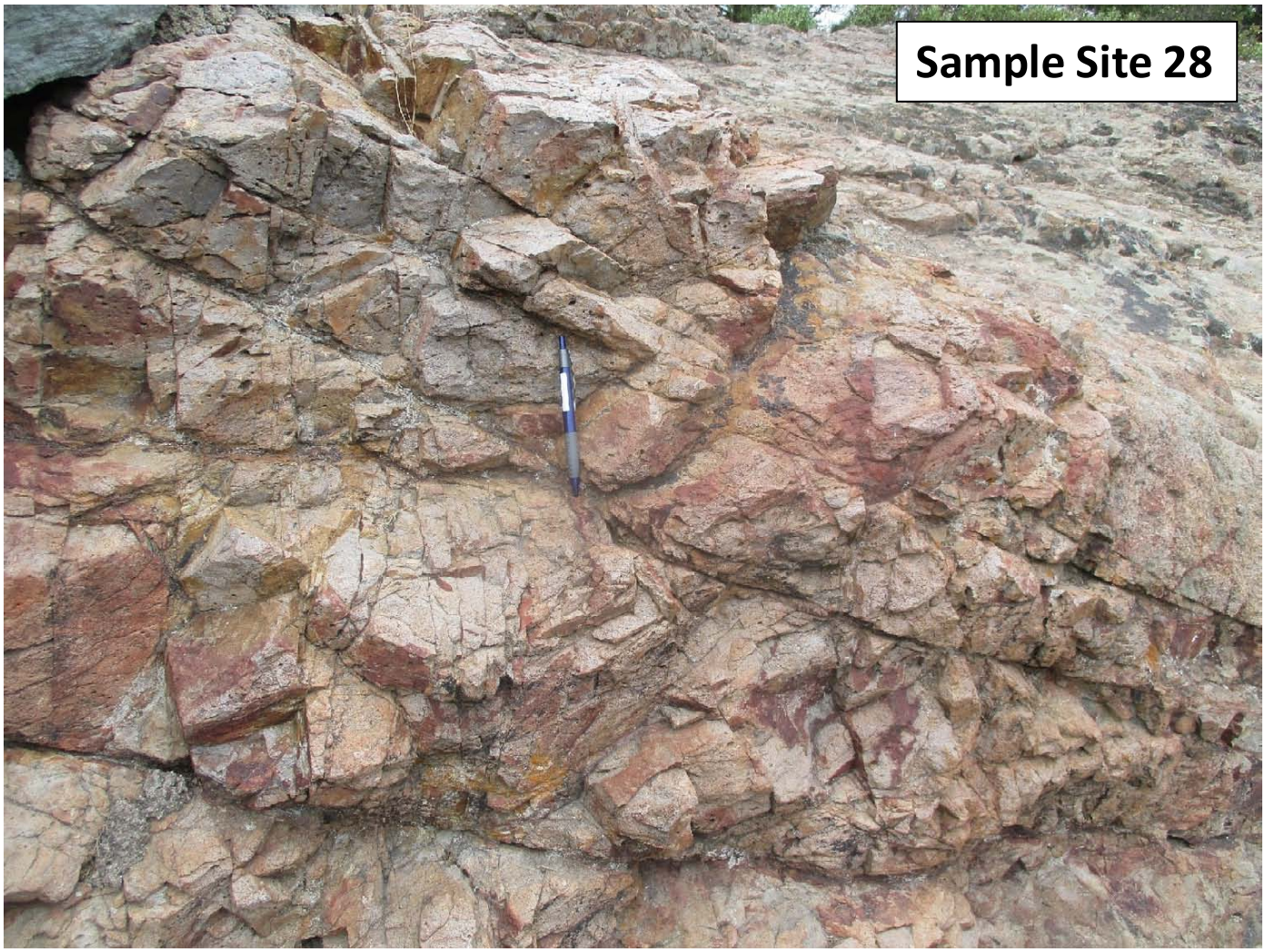
15-A
15-A 27° 59,450 N 15° 37,901 W 10 m Spain - Canary Islands

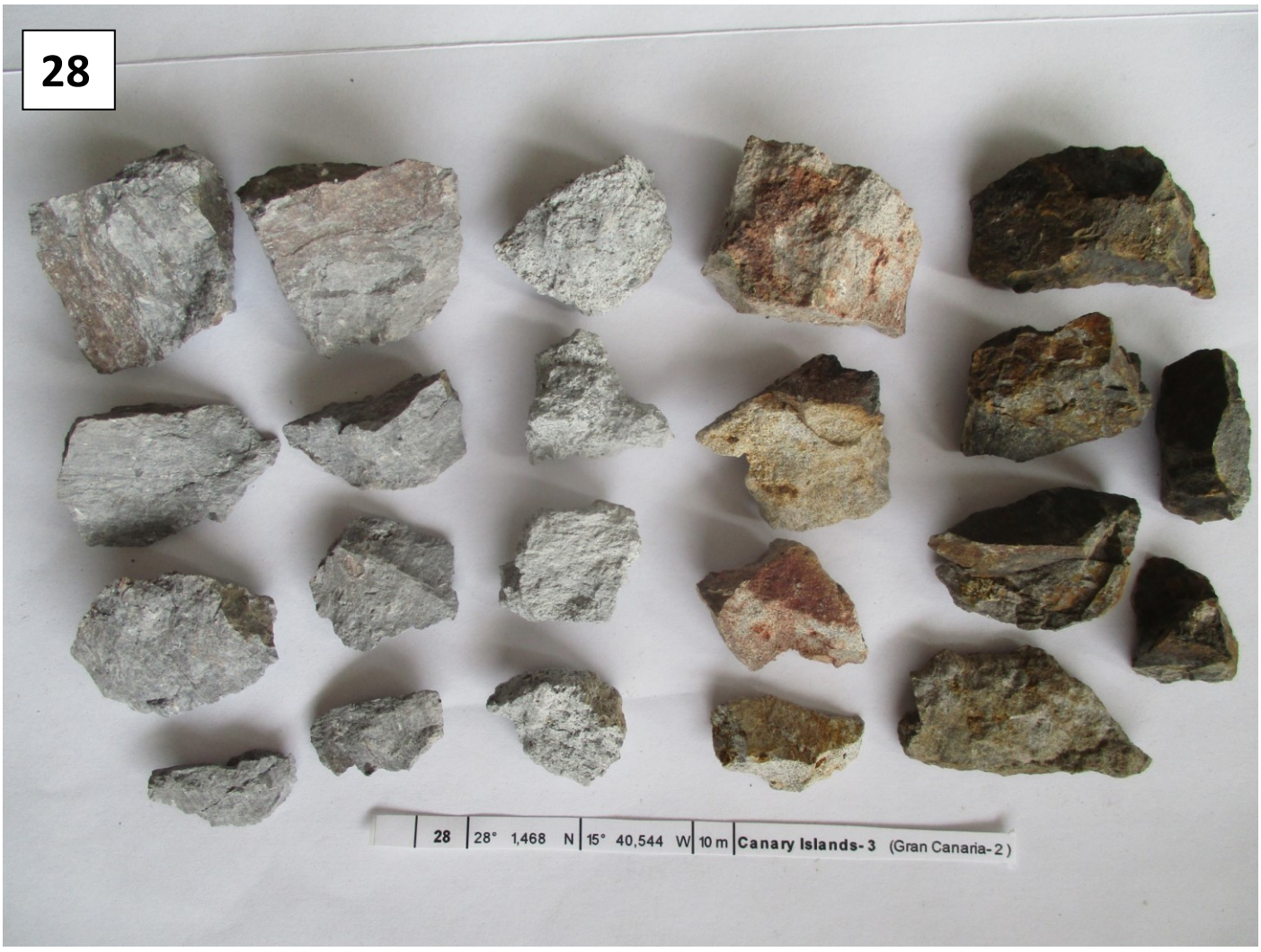

Sample Site 23

23
23 | 27° 52,624 N | 15° 40,220 W | 5 m | Canary Islands-3 (Gran Canaria-2)


Sample Site 25

25
25 | 27° 57,805 N | 15° 34,232 W | 12 m | Canary Islands-3 (Gran Canaria-2)


Sample Site 28


28
28 | 28° 1,468 N | 15° 40,544 W | 10 m | Canary Islands-3 (Gran Canaria-2)

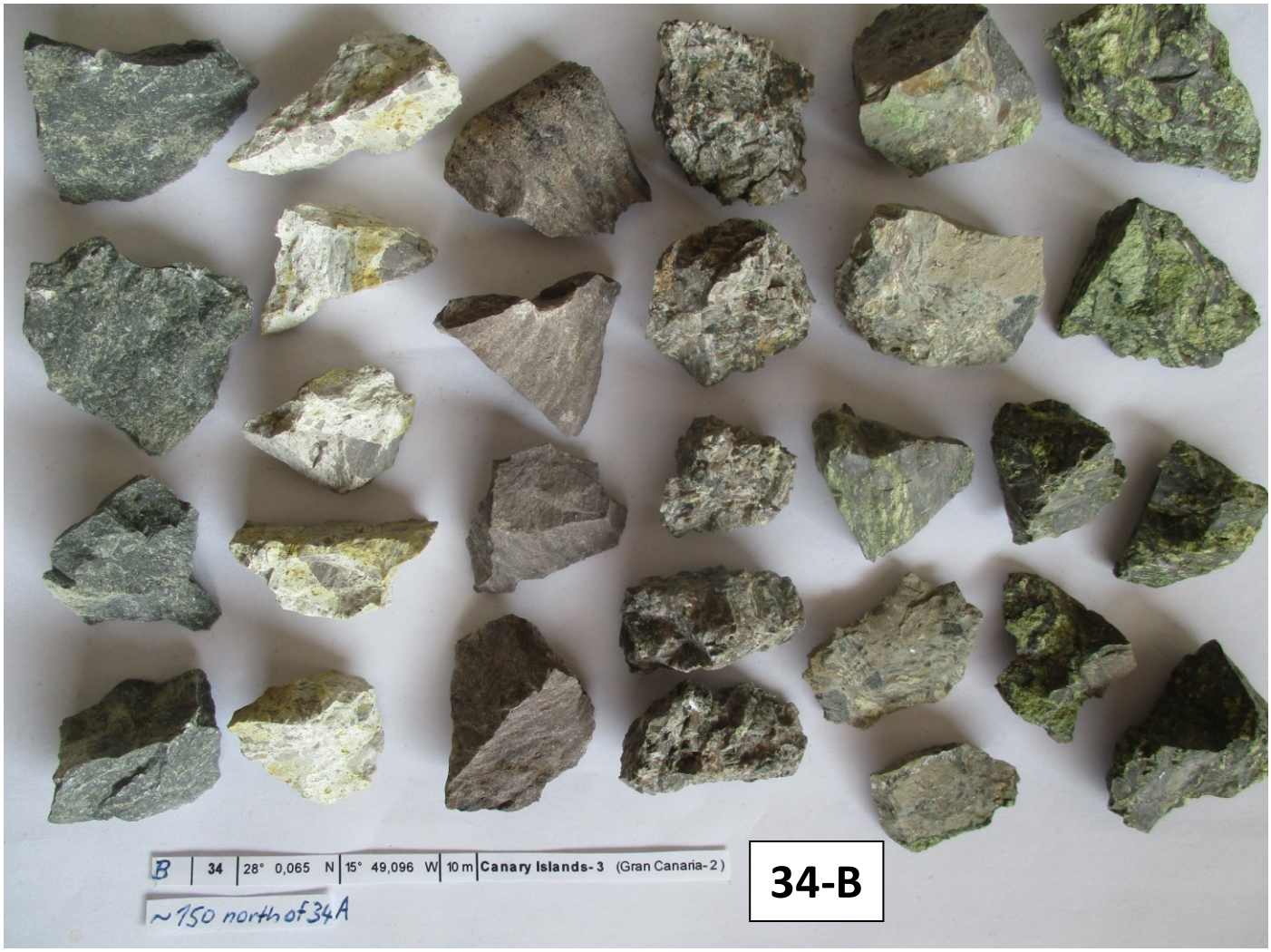
Sample Site 29

Sample Site 32

Sample Site 33

33

Sample Site 34-B



Appendix 2 : A short overview : The Raman bands (peaks) of Quartz shocked with 22-26 GPa

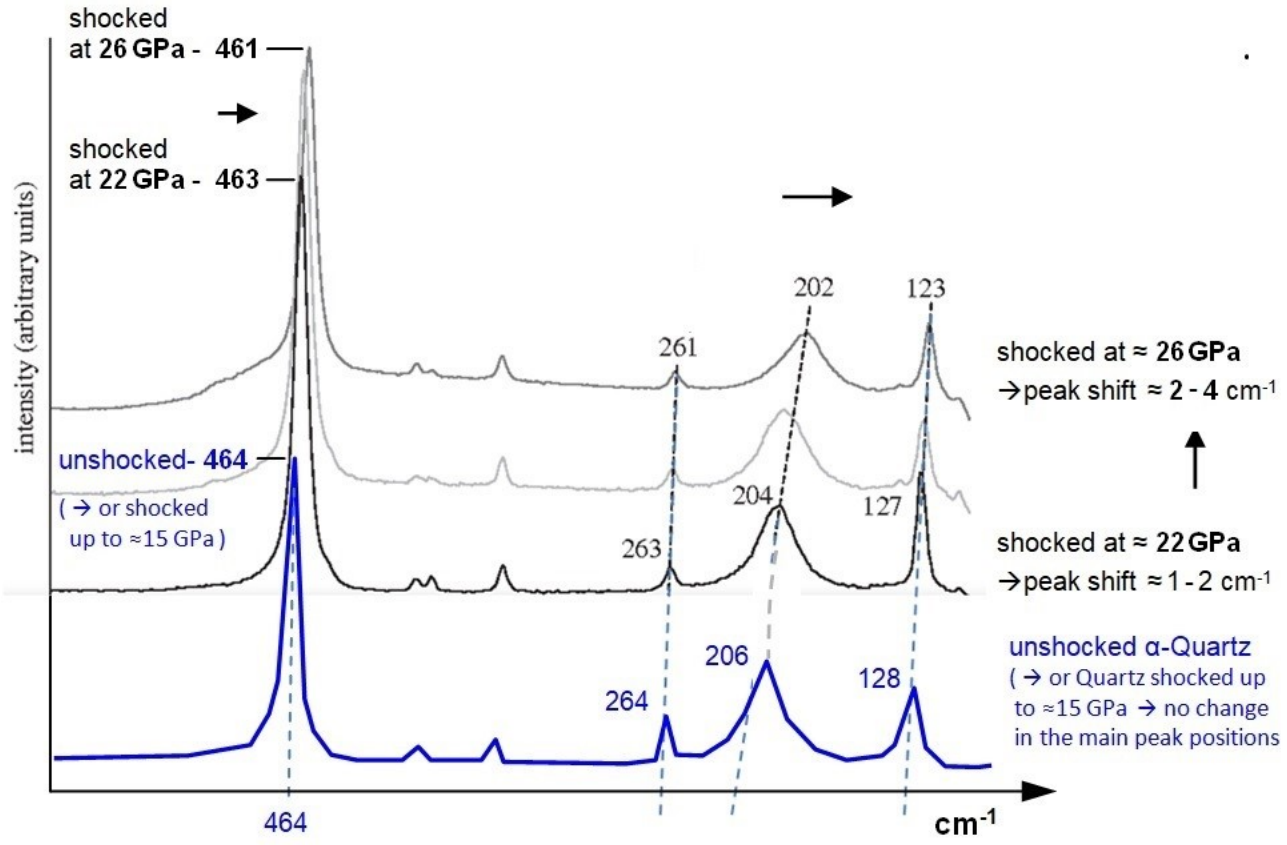
In order to verify a sample site as an impact site or impact structure, shock-metamorphic effects must be discovered in the rocks of the sample site. This can be done by different methods.

For example with the help of PDFs (planar deformation features) which are visible in the quartz with the help of a microscope. However this requires careful preparation of the samples and expertise.

Another, easier method, is the use of a RAMAN microscope. Micro-RAMAN Spectroscopy on quartz grains in the samples can provide the first evidence for a shock event, that was caused by an impact.

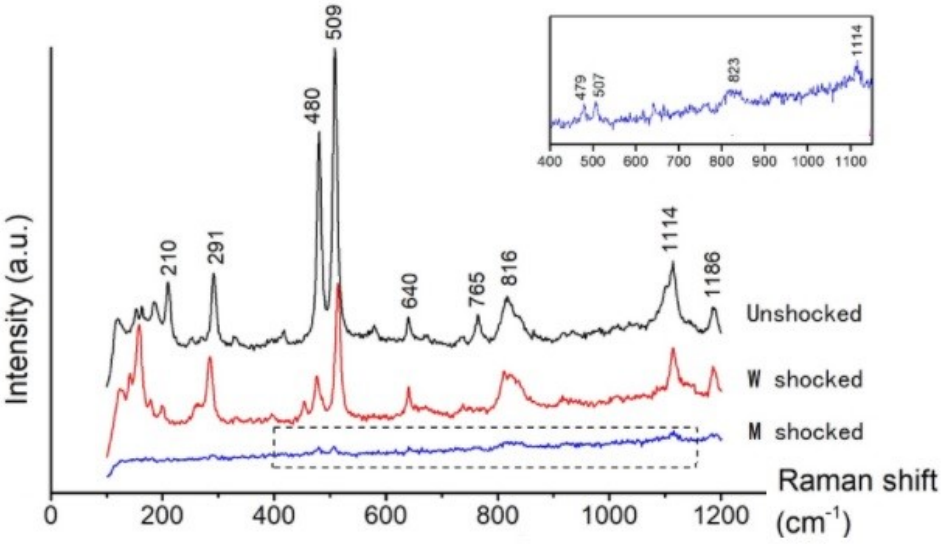
Mc Millan et al. (1992) and others have shown that the main RAMAN-peaks of Quartz shift towards lower frequencies if the Quartz was exposed the a shock-pressure > 15 GPa. → see diagram below

The shift of the main quartz RAMAN-peaks can be used to identify quartz that was shocked by an impact



Quartz shocked with **22 GPa** and **26 GPA** shows shifts of the main RAMAN-peaks of 1 - 4 cm^{-1} to lower frequencies

Appendix 3 : Raman spectra of (W) weakly-shocked & (M) moderately-shocked Alkali-Feldspar



Weakly shocked alkali feldspar mainly developed irregular fractures and undulatory extinction. Note that the Raman-lines 210 and 765 are missing in the w-shocked feldspar, and an additional line at ≈ 150 appears.

The shock pressure for the w-shocked feldspar was estimated to be between 5 and 14 GPa

References :

Photos of all Sample Sites & Rock Samples are available on : Sample Sites "Tejeda Crater" (or alternatively here)

The following Impact-Craters & -structures belong to the same large-scale secondary impact event caused by the PTI :

The 130 x 110 km Bay-of-Lyon Impact Crater (France)_Raman spectra of selected Rock Samples (or here)

A 30 km Impact Structure and a 1.6 x 1.2 km Elliptical Crater in Southern Spain_Raman Spectra of Rock Samples (or here)

Impact Craters on Fuerteventura & Tenerife: Raman-anlaysis of rock-samples published soon on vixra.org & archive.org

Please also read : 1.) Scientific Studies to **Fuerteventura & Canarian Island's Geology** (→ links on page 2 !) - (→ or here)
2.) Scientific Studies to **Tenerife & the Canarian Island's Geology** (→ links on page 2 !) - (→ or here)

The Permian-Triassic (PT) Impact hypothesis - by Harry K. Hahn - 8. July 2017 :

Part 1 : The 1270 X 950 km Permian-Triassic Impact Crater caused Earth's Plate Tectonics of the Last 250 Ma
Part 2 : The Permian-Triassic Impact Event caused Secondary-Craters and Impact Structures in Europe, Africa & Australia
Part 3 : The PT-Impact Event caused Secondary-Craters and Impact Structures in India, South-America & Australia
Part 4 : The PT-Impact Event and its Importance for the World Economy and for the Exploration- and Mining-Industry
Part 5 : Global Impact Events are the cause for Plate Tectonics and the formation of Continents and Oceans (Part 5)
Part 6 : Mineralogical- and Geological Evidence for the Permian-Triassic Impact Event

Alternative weblinks for my Study **Parts 1 - 6 with slightly higher resolution** : Part 1, Part 2, Part 3, Part 4, Part 5, Part 6
Parts 1 – 6 of my PTI-hypothesis are also available on my website : www.permiantriassic.de or www.permiantriassic.at

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